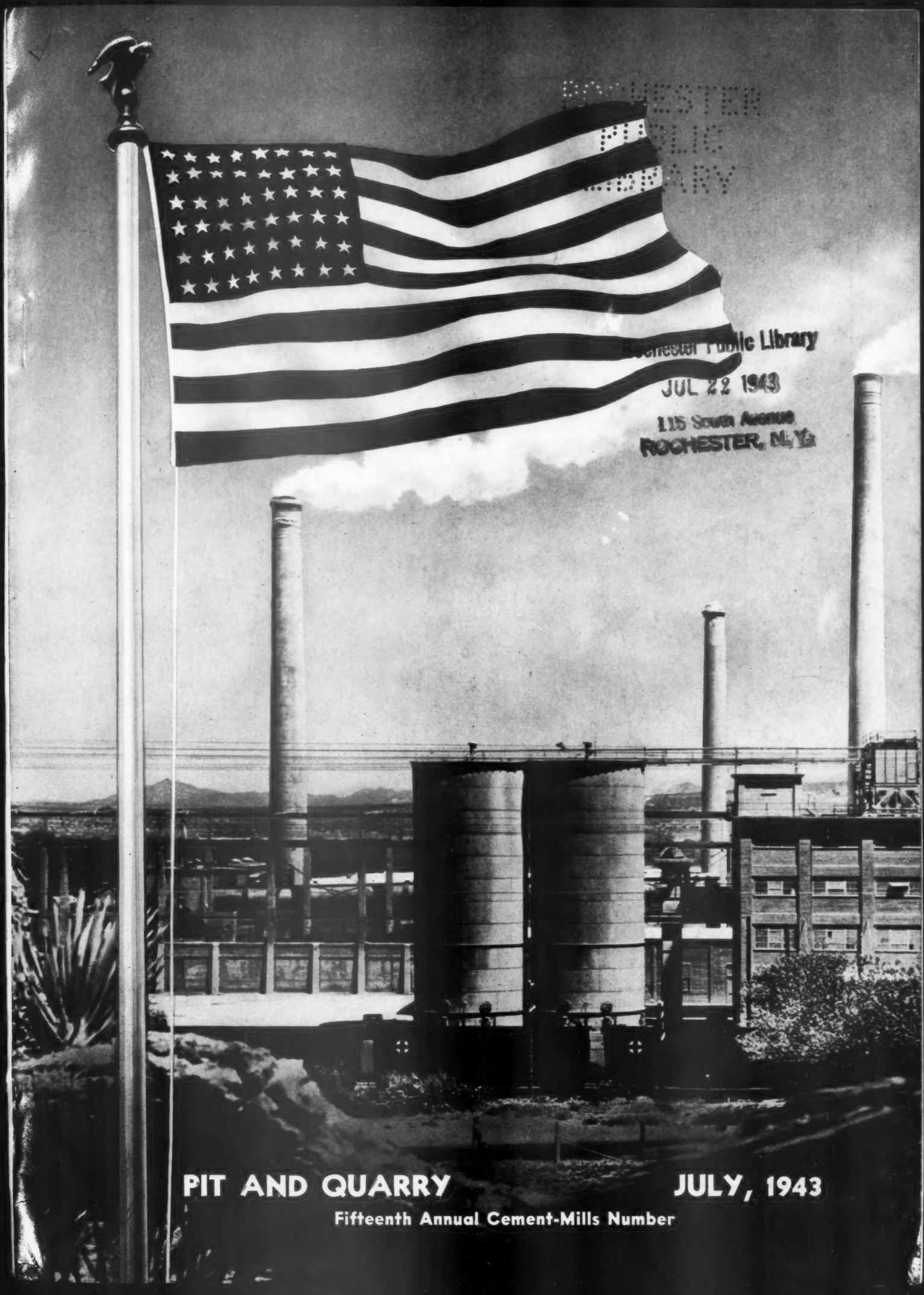

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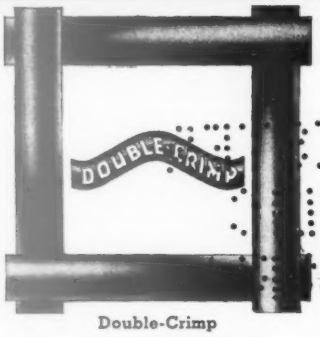
ROCHESTER, N. Y.

PIT AND QUARRY

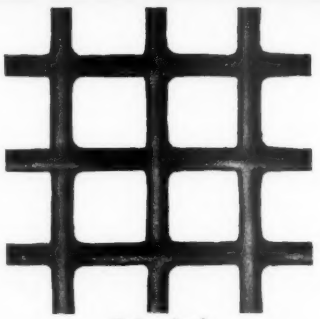
JULY, 1943

Fifteenth Annual Cement-Mills Number



Double-Crimp

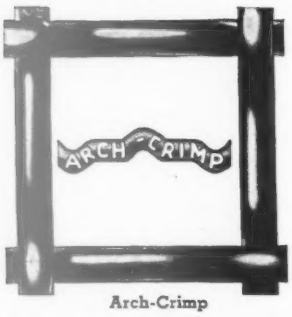
"The Perfect" Wire Cloths and Screens



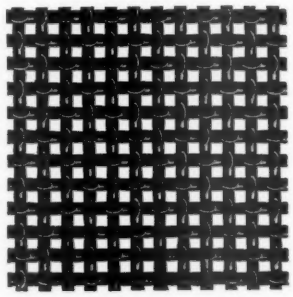
Galvanized

of

SUPER-LOY
STEEL
GALVANIZED STEEL
STAINLESS STEEL
NICKEL-CHROME STEEL
PHOSPHOR BRONZE
BRASS
COPPER
MONEL
NICKEL
ALUMINUM

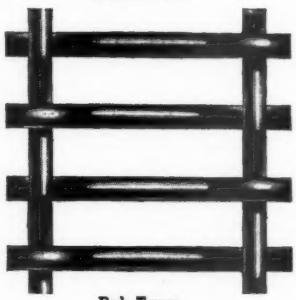


Arch-Crimp

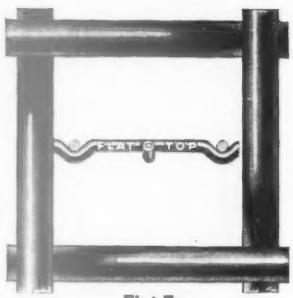


Calendered

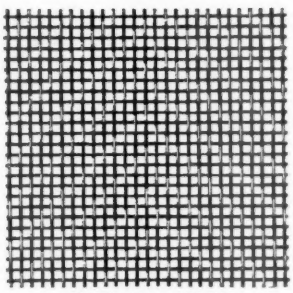
Intermediate-Crimp



Rek-Tang



Flat-Top



Herringbone Twill

•

Any Special Metal for Any Service

"Perfect" WEAVES

Arch-Crimp
Coiled
Double-Crimp
Double-Fill
Dutch
Flat-Top
Herringbone
Intermediate-Crimp
Rek-Tang
Selvage-Edge
Straight-Warp
Stranded
Sta-Tru
Triple-Warp
Twilled
Twisted-Fill
Twisted-Warp

"Perfect" PROCESSING

Arc-Welding
Bending
Binding
Brazing
Calendering
Coiling
Crimping
Cutting
Dipping
Dishing
Finishing
Flanging
Flattening
Forming
Framing
Galvanizing
Jointing
Knuckling
Painting
Rolling
Selvaging
Shaping
Shearing
Slitting
Soldering
Spot-Welding
Squaring
Stitching
Tack Welding
Trimming

"Perfect" PRODUCTS

Baskets
Circles
Coils
Cones
Cylinders
Discs
Forms
Leaves
Lengths
Panels
Pieces
Ribbons
Rings
Rolls
Sections
Segments
Strips
Templates

Illustrations show items listed in bold-face type.

Other wire cloths and screens will be illustrated in subsequent advertisements of this series.

Sta-Tru

THE LUDLOW-SAYLOR WIRE CO.

ST. LOUIS, MISSOURI

Two Easton TR-13H trailers hauled in train. Hydraulic side-dump Phoenix bodies. Designed for a cement plant quarry. Overall capacity, 40-45 tons.

LOOK AT IT THIS WAY...

Your haulage problem *is* different! When you plan to install a modern haulage system you must be ready to employ unprecedented ideas in design, construction or operation. Most likely some of these ideas will be your own, developed through long association with your own special operating problems. Easton engineering helps you to put your ideas to work. Your help from Easton is based on over twenty-five progressive years of experience with track and trackless equipment for moving earth, rock and ore. To help you achieve your desired capacity at lowest cost per ton Easton engineers are at your service. For free counsel call or write to Easton Car & Construction Company, Easton, Pa.

EASTON

Industrial Cars • Trailers • Electric Lift Trucks

PIT AND QUARRY, July, 1943, Vol. 36, No. 1. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $2 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 50 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.

this team can cut . . .

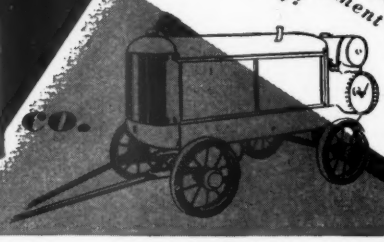
YOUR POWER COSTS!

BUDA Low Pressure DIESEL

NO ordinary engine could offer the steady, shift-after-shift, low-cost power output that Buda's modern engineering skill designs into Buda Diesels . . . that Buda's 65 years of manufacturing experience translates into a smooth, rugged, longer-lived power plant to cut *your* power costs to a minimum.

Want proof? Call your nearby BUDA distributor—let him show you the features that make a BUDA engine—Diesel or gasoline, 20 to 340 h.p.—your best investment in power today!

Remember . . . BUDA Powered means BETTER Powered—Specify BUDA engines on the equipment you buy!



the BUDA co.

Harvey (Chicago Suburb) Illinois

SHOW 'EM YOU ARE CONSERVING!

One of two Lorains of Valley Dolomite Company, Missouri.

DISPLAY THIS FREE EMBLEM

(Actual size 5″ in diameter)

● It's only a red, white and blue sticker but it means a lot to Uncle Sam's war effort because it shows that these operators are conserving their particular construction equipment—making it last longer and work faster, with all the means and experience at their control.

Doesn't make any difference what you run—shovel, bulldozer, tractor, scraper or truck—there's one of these colorful 5″ emblems for you. Just send your name and address and say that you want to show others that you are conserving.

Important . . .

Operators of *all types and makes* of equipment are welcome to send for the same red, white and blue emblem. Easy to apply on metal, glass or wood. Nothing to sign except your name and address on a post card addressed to us.

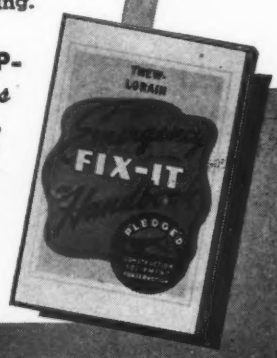
THEW-LORAIN

CRANES · SHOVELS
DRAGLINES · MOTO-CRANES

24-Pages of HOW-TO-KEEP-'EM-ON-THE-JOB *Ideas*

Want some practical ideas on how to make quick, emergency repairs; on how to temporarily substitute for critical, hard-to-get parts and materials? Then write for this new Fix-It Handbook. It will help you salvage and conserve worn parts and will save you time and money, too.

THE THEW SHOVEL COMPANY
LORAIN, OHIO



TELSMITH

CRUSHING AND SCREENING PLANT

U. S. Army Engineers are building a huge dam in Tennessee. It will require 1,500,000 tons of aggregate—4 sizes of crushed rock: 3″- 6″, 1½″- 3″, 3/16″- ¾″, minus 3/16″; and one size of sand.

To produce this material, Ralph E. Mills Co., of Roanoke, Va., opened a quarry at the dam site. The rock is a high calcium limestone. Telsmith designed the complete crushing and screening plant, and furnished most of the equipment. Capacity is in excess of 200 tons per hour.

On war jobs, equipment as well as men must produce more *and faster* without "cracking" under the strain. For years Telsmith has been building equipment that can turn it out, without taking time out. Telsmith complete sand and gravel and rock crushing plants are a *known quantity* to miners, contractors and aggregate producers.

That's why Telsmith gets the call on so many war jobs—to build army and navy air bases, dry docks, roads, dams, and other big construction projects.

That's why your Uncle Sam is now taking most of the Telsmith equipment being built. It's going overseas, to build for the armed forces' needs.

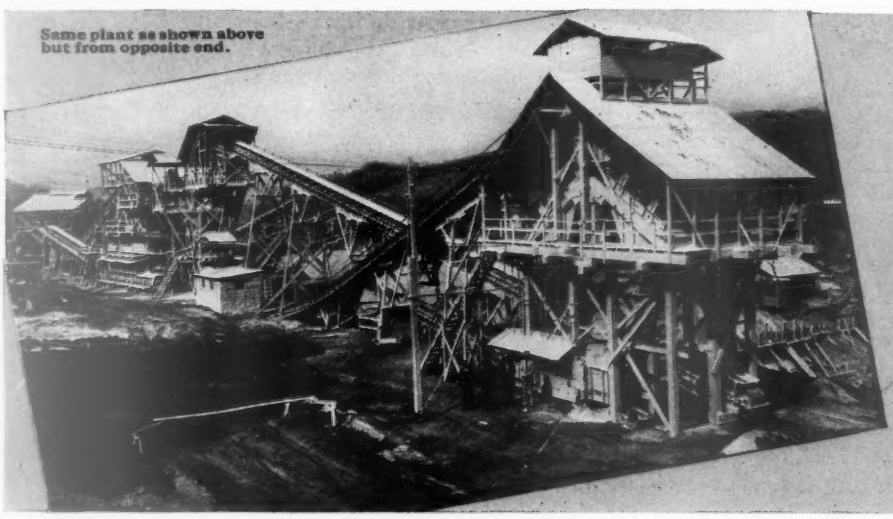
You can get Telsmith equipment—for war work now—and after the war for all your needs. Get Bulletin Q-15 today.

SMITH ENGINEERING WORKS, 504 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Q-9

Room 1604—50 East 42nd St. New York City
211 W. Wacker Drive Chicago, Ill.
713 Commercial Trust Bldg. Philadelphia, Pa.
19-21 Charles St. Cambridge, Mass.
G. F. Seeley & Co Toronto, Ont.
Mines Eng. & Equip. Co. San Francisco—Los Angeles
Brandeis M. & S. Co. Louisville, Ky.
Charleston Tractor & Eqpt. Corp. Charleston, W. Va.
Roanoke Trac. & Eqpt. Co. Roanoke, Va.
Clift L. Priester 911 S. 3rd St., Memphis, Tenn.
Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn.



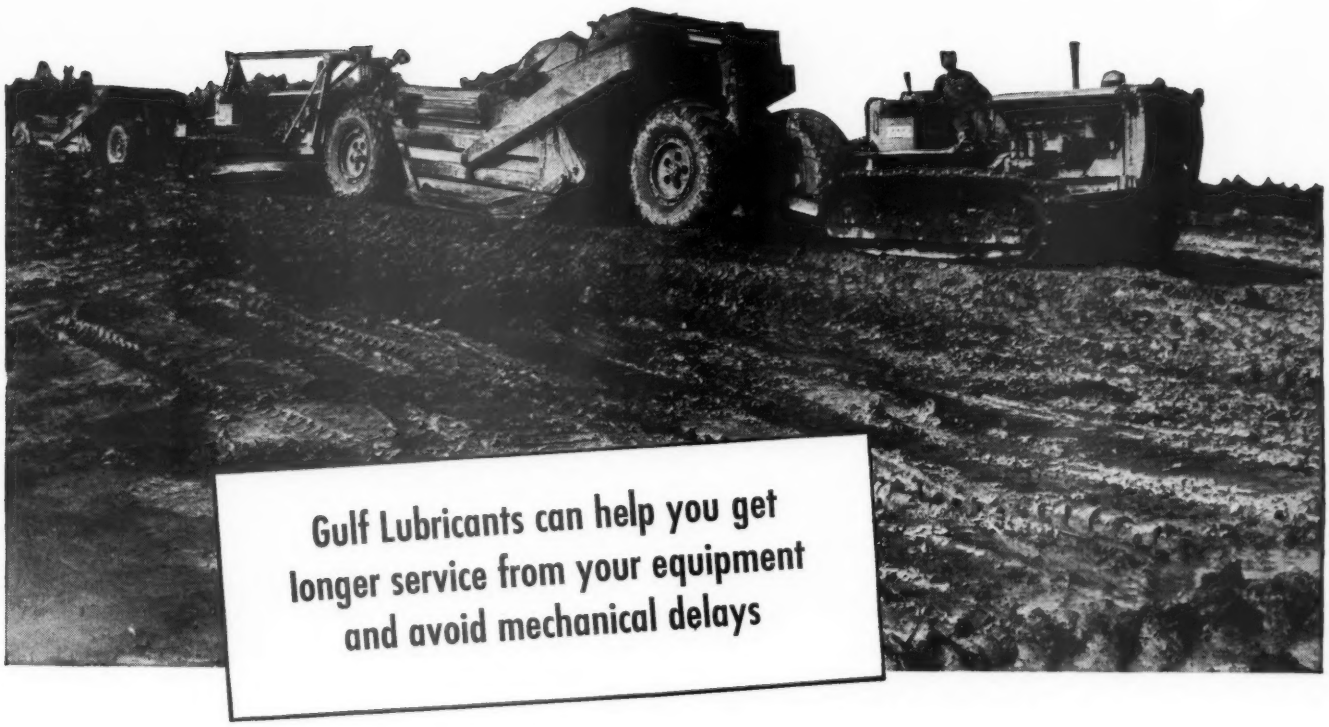
TELSMITH
Quarry Plant Equipment

One	48″ x 12′ Telsmith Heavy-Duty Apron Feeder
One	36″ x 180′ Telsmith Belt Conveyor
One	48″ x 7′ Telsmith Plate Feeder
One	36″ x 182′ Telsmith Belt Conveyor
One	16-B Telsmith Primary Breaker
One	24″ x 78′ Telsmith Belt Conveyor
One	24″ x 75′ Telsmith Belt Conveyor
One	No. 48 Telsmith Gyrasphere Secondary Crusher
One	36″ x 131′ Telsmith Belt Conveyor
Two	4′ x 12′ Telsmith Double Deck Pulsator Screens
Two	18″ x 21′ Telsmith Belt Conveyors
Two	4′ x 10′ Telsmith Single Deck Pulsator Screens
Twelve	Telsmith Bin Gates
Three	18″ Telsmith Belt Conveyors
One	18″ x 105′ Telsmith Belt Conveyor

Mud, dust, or sand . . . hot or cold

Gulf Quality Lubricants provide

greater protection against excessive wear



"All-weather protection with Gulf quality lubricants played a big part in our finishing up months ahead of schedule," says the contractor on this large airport project. "In spite of widely varying operating conditions as the job progressed, our equipment made an outstanding efficiency record and we experienced no failures of lubricated parts."

With spare parts and new units so difficult to obtain, breakdowns of key equipment on the job are a serious matter. So proper lubrication—always a big dividend payer to contractors—is now a vital requirement for keeping up to contract schedule.

Here's how to play safe on your next job: Call in a Gulf Service Engineer and ask him to recommend the best lubrication for your equipment. From Gulf's complete line, he will prescribe oils and greases exactly suited to your requirements—tough and stable oils and greases that stand up and provide better protection against excessive wear under every operating condition. This kind of lubrication will insure more efficient service from every unit, a minimum of operating delays, and lower maintenance costs.

The services of a Gulf Engineer—and the Gulf line of more than 400 quality lubricants—are available to you throughout 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION
GULF REFINING COMPANY, PITTSBURGH, PA.

Pick Your

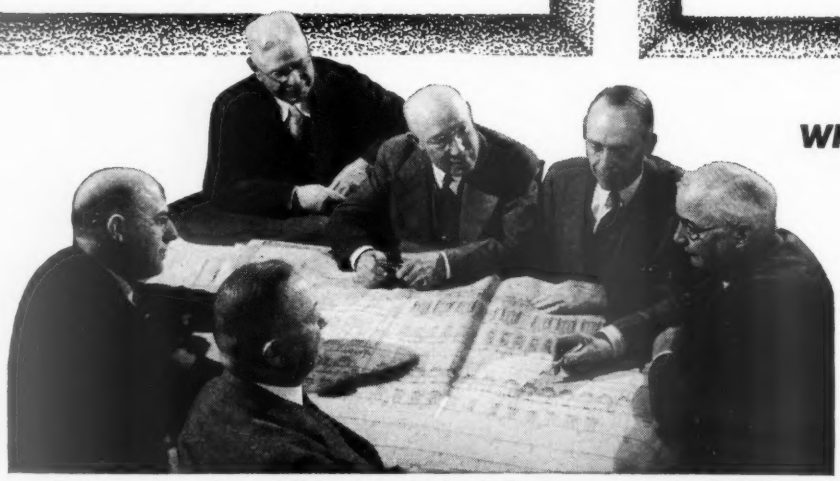
HERE ARE FOUR OF THE MOST PRESSING PRO

Labor Shortage?

Does part of your process use men needlessly? Remember, crushing is a *machine* industry!

Unexpected Breakdowns?

How many of your key machines were designed for 24-hour-day service? Good point to check today!



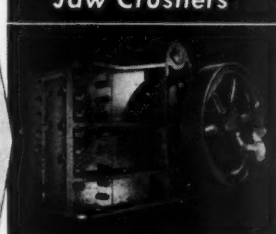
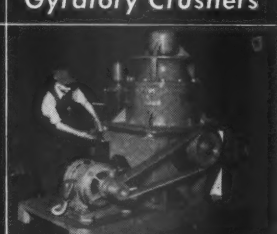
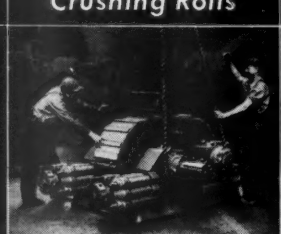
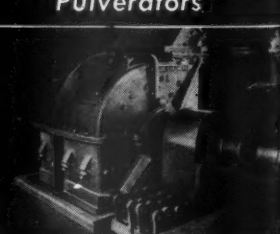
Collaboration of specialists is basic in A-C Cooperative Engineering.

WHICHEVER IT IS — **CALL**

MEN must work together better than ever before to win this war... *and so must machines!*

If failure of machines to work together properly is at the root of your wartime processing problem, remember there's one company that *specializes* in making machines "team up"... Allis-Chalmers.

Only Allis-Chalmers Makes a Complete Line of this Equipment!

Jaw Crushers	Gyratory Crushers	Crushing Rolls	Pulverators
			
All-steel primary and fine reduction. ¼"-12" product.	High-speed primary and secondary. 3" to 60" size feed.	6 different types. Reduction ratios from 5-1 to 10-1.	"Multi-impact" reduces non-abrasives to cubical shape.

Picture!..

GPROBLEMS FACING PROCESSORS TODAY—

Lagging Schedules?

Maybe you have a bottleneck machine in your plant — possibly an added machine would load up other units.

Overworked Engineers?

Outside engineering cooperation may be all that's needed to get your staff out of a hole.

ON ALLIS-CHALMERS!

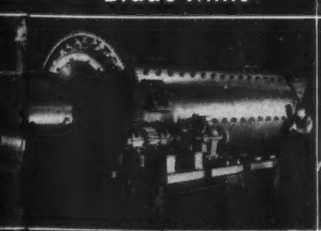
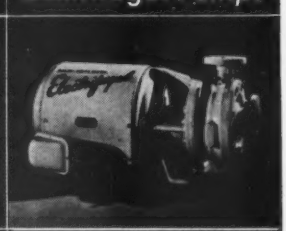
Here's a company that engineers and builds *all types* of basic processing equipment . . . in the *complete line* highlighted below.

Thus when you call on Allis-Chalmers Cooperative Engineering, you deal with engineers who are "complete line" engineers. They know *all* phases of the basic processes . . . how they all *fit together*.

Result: you get recommendations that make existing equipment "team up" better . . . to give you greater wartime production.

Don't let another day go by without putting Allis-Chalmers Cooperative Engineering to work on *your* problem. No obligation, of course. Call your nearby A-C district office. Or write ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

A 1562A

Blade Mills	Vibrating Screens	Log & Sand Washers	Motors & Drives	Centrifugal Pumps
				
For washing and disintegration of materials up to 12".	Efficient separation and dewatering — 8 different types.	All-welded modern units for materials up to 3½" size.	Unbeatable team—Lo-Maintenance Motor & Texrope V-belts.	Largest line, highest efficiencies — built with motors.

BELTING AND HOSE WITH "THE THUMB"

It is the thumb that gives the human race its mastery and control of physical activity. It is the thumb that is absent in the lower animals. It is the thumb that symbolizes power and capability.

The reason we say "Belting and hose with 'the thumb'" is because the implication of that statement comes nearest to picturing the qualities that go into these and other Thermoid Products. The engineers and production technicians who produce Thermoid Industrial Rubber Products think in terms of end-use. They live the problems of the field. To them, for instance, the safety-factor requirements are not dry statistics, but matters of vital importance.

When "Thermoid" is on the products, everyone from the President down knows that the Purchasing Agent is buying the best that can be had.

P.S. In line with material conservation, Thermoid has prepared a series of bulletins on how to extend the life of rubber products now in use. You might find them helpful as reminders to be passed on to your operating people. Feel free to ask for copies.

THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products.

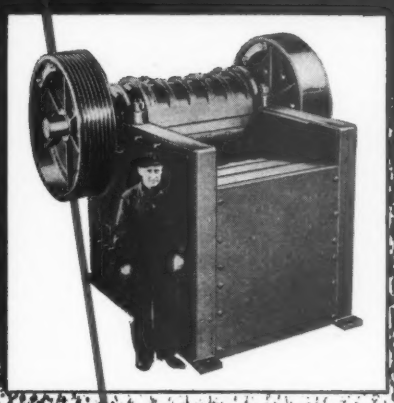
Thermoid Rubber

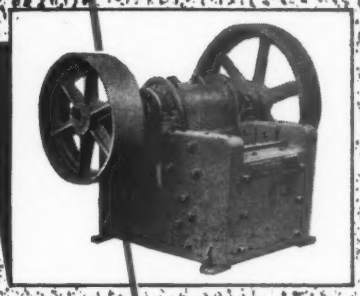
DIVISION OF THERMOID CO.
TRENTON, NEW JERSEY

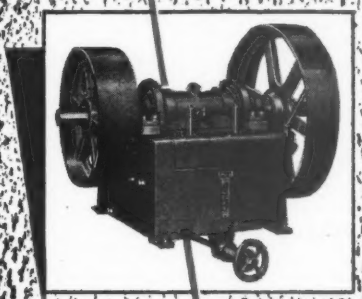
IT'S GOOD BUSINESS TO DO BUSINESS WITH THERMOID

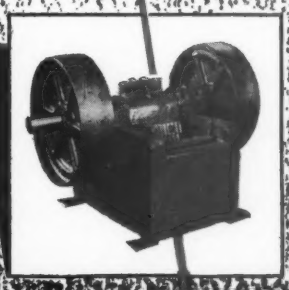
Pioneer now offers---

A COMPLETE NEW LINE









Welded Base JAW CRUSHERS

Pioneer Jaw Crushers have been redesigned and new refinements and improvements have been added. The bases are constructed of steel plates — double walls — reinforced and welded. Larger shafts and bearings and longer jaws have been added in some models. All sizes are overhead eccentric type with manganese steel reversible jaw plates.

The James F. Lincoln Arc Welding Foundation
CERTIFICATE OF AWARD
Pioneer Engineering Works, Inc.
Ralph W. Hart and Williams Oldsley
Cleveland, Ohio

PIONEER JAW CRUSHER SIZES: 3042 — 2436 — 2036 — 1536 — 1036 — 1524 — 1024 — 1020 — 1016

All sizes of Pioneer Jaw Crushers are equipped with SKF self-aligning bearings. The 1016 and 1020 are also available with bronze bearings.

WORKING FOR WAR TODAY
PIONEER
PLANNING FOR PEACE TOMORROW

Pioneer

ENGINEERING WORKS
MINNEAPOLIS, MINNESOTA, U. S. A.

Result of Synergistic Thinking

The scale loading card which gives the number of drill holes in a section, the charges to be used, instructions for the deck load, and the number and length of electric blasting caps, is the result of synergistic thinking. It is the kind of thinking that yields a "plus value" in rock that is well-shot, easier to handle, less costly to move.

The Next Step Beyond Cooperation — SYNERGISM

COOPERATION paves the way for synergistic thinking—when minds, cooperating to get better results, "click" from the impact of idea meeting idea and evolve a result that is far greater than the sum total of the ideas expressed.

There is nothing mysterious about synergistic thinking. It comes when "know-how" minds get together and spark the "big idea" into existence. It happens frequently when Atlas representatives meet our quarry customers. It has produced surprisingly profitable results, too, in engineered blasting—better methods for greater results at lower costs.

It is amazing how synergistic thinking, beforehand, can be charted into practical accomplishment—put down in the form of a guidance chart for a better blasting operation. And the guidance charts which produce a "2 + 2 = 5" result, come from the "clicking" together of buyer and seller ideas, building on knowledge and experience.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. Offices in principal cities • Cable Address—Atpowco

10 COMMANDMENTS FOR LONGER ROPE LIFE

not forgetting

HAZARD'S *ENDURING* **LAY·SET** *Preformed*

Conserve steel by making every piece of equipment last longer. Steady production by keeping your machines in uninterrupted operation. Since the operation of your machines depends upon wire rope, make sure your operators keep these commandments:—

1. Inspect, clean and lubricate all wire rope regularly. Tighten fittings.
2. Be sure the rope is the proper one for the service. Ask your Hazard wire rope man.
3. If drums or sheaves are small, or the kinking tendency pronounced, specify LAY-SET Preformed, the rope that resists bending fatigue and kinking.
4. Check your sheave or drum grooves. Worn grooves play havoc with wire rope.
5. Don't let rope rub against any standing part.
6. If the rope deviates from the center plane of the sheave more than 1½ degrees, undue wear will result.
7. Keep sheaves aligned and bearings tight and properly lubricated.
8. Don't allow bad spooling on drums. Hazard LAY-SET Preformed spools evenly under most conditions.
9. Don't jam on power or brake. Jerky operation accelerates rope failure.
10. Don't let a load spin and twist the rope.

Get the experienced recommendations of a Hazard wire rope man. Specify Hazard LAY-SET Preformed for a rope that resists bending fatigue, kinking and snarling. Use LAY-SET because it spools better, is faster and safer to handle, lasts longer.

Keep equipment in good condition. Make it last longer.

GREEN SIGNIFIES SAFETY

HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

HAZARD LAY·SET *Preformed* WIRE ROPE

WHAT STEEL COMPANY MADE THE TEETH THAT DUG THE PANAMA CANAL?

THE digging of the "Big-Ditch" was—and still is—one of the great engineering triumphs of all time. Its construction involved the solution of many difficult problems and pioneered many advances. Among these, was the adoption of TISCO "Panama" patented two-part Teeth for the steam shovels used in excavating. Two big advantages were gained: The great wear-resistance of TISCO Hadfields Manganese Steel and the easy, quick replacement or reversibility of worn teeth.

Hadfields Manganese Steel was first produced in America by this company (1892). It has supplied the solution to countless applications requiring resistance to heavy abrasion and impact, such as railway trackwork, mine and quarry equipment, paper making machinery, dredges, shovels and many industrial uses.

240,000,000 cubic yards excavated . . . and most of it dug with TISCO "Panama" DIPPER TEETH

LEFT. *British tank equipped with TISCO Manganese Steel Tank Treads.*

Taylor-Wharton Products

Manganese Steel Castings • Alloy Castings and Forgings • High Pressure Gas Cylinders • Manganese-Nickel Welding Rod • Alnico Permanent Magnets Special Trackwork

FOUNDED TW 1742

Taylor-Wharton Iron & Steel Co.

HIGH BRIDGE, NEW JERSEY • EASTON, PENNSYLVANIA

MOVING A MOUNTAIN TO *FEED* A WAR

RIGHT NOW—*today*—American men and equipment are performing miracles. Even the task of moving mountains has become more fact than fancy.

In the huge open pits which hold the critical minerals we need for Victory, you'll hear the incessant hum of motors as big P&H Electric Shovels keep up their steady digging rhythm — wresting raw materials from the earth to feed war's enormous appetite.

Dreams which began almost 60 years ago are today realities that are serving America in her time of need — in mining, in industry, in construction work of many kinds. They are the dreams that made P&H a leader in applying electrical power to the movement of heavy loads — to save human labor and help create a better world.

P&H

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS • HOISTS • WELDING ELECTRODES • MOTORS

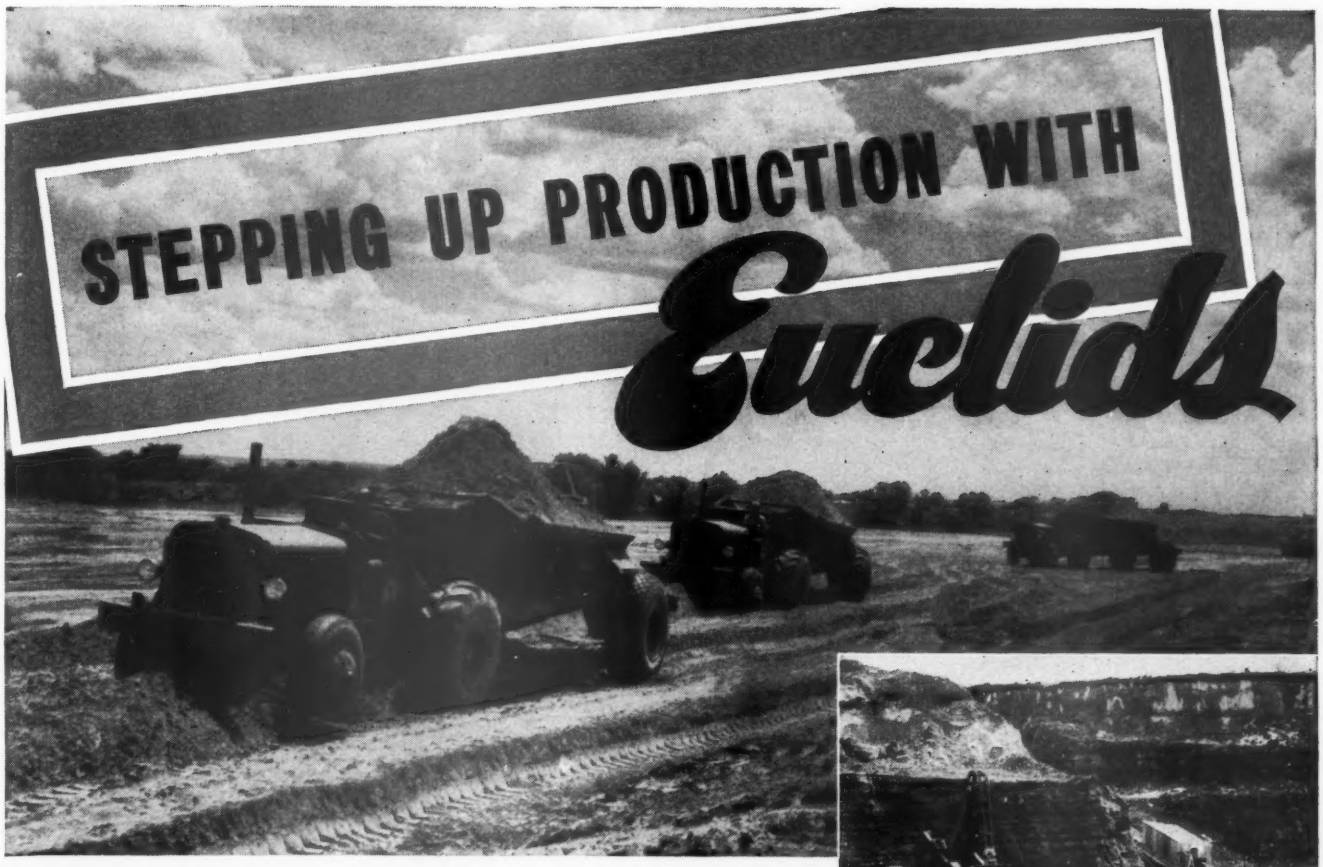
4585 W. National Ave.
MILWAUKEE, WISCONSIN
Electric Cranes • Electric Hoists • Arc Welders
Excavators • Welding Electrodes

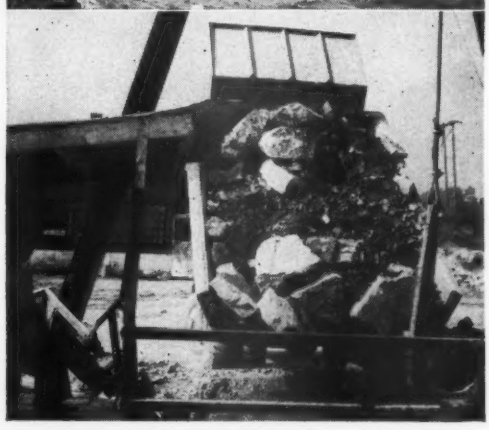
EVERY DRAGLINE OPERATOR SHOULD HAVE THIS BULLETIN. It illustrates in detail how the DRAGLINER is (1) Scientifically designed for great strength and durability. (2) The round smooth front end cuts digging resistance. (3) The Manganese Steel combination hitch plates and bumpers to take the shock and protect the arch and drag hitches. THE DRAGLINER CANNOT BE DROPPED ON THE ARCH. (4) Trouble free lips and teeth as well as a number of features not found in any other design all of which contribute to increased yardages of hard-to-dig materials.

Designed and Sold by
DANIELS-MURTAUGH CO., Cedar Rapids, Ia.

Built by
UNIVERSAL ENGINEERING CORP.

STEPPING UP PRODUCTION WITH *Euclids*





● Increasing production, or even maintaining present levels, is a tough problem these days when men and equipment are not readily available. Bottom-Dump and Rear-Dump Euclids are helping to solve production problems for many industrial and contractor owners because of their dependable performance on around the clock schedules.

The demands for Euclid equipment by the Army, Navy and other essential users may prevent you from obtaining the advantages of Euclid speed and capacity now, but we would like to plan with you for the time when priorities no longer restrict the sale and use of Euclids.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

EUCLID

SELF-POWERED HAULING EQUIPMENT
For EARTH . . ROCK . . COAL . . ORE

CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS

EUCLID THE PIONEER

Power And Speed For QUICK ACTION

On the War Front

No breakdowns...no letdowns...when *quick action* is needed with Koehring simple controls and smooth operation. Quick accessibility makes it easy for the operator of a Koehring Shovel to keep all parts of his machine well lubricated and clean. And smooth operation enables him to maintain top production for maximum output per shift. Keep your Koehring shovel in a natural smooth running condition for the duration. New equipment is now available only to the armed forces or highly essential military construction projects.

KOEHRING COMPANY • *Milwaukee, Wisconsin*

Depend on your Koehring distributor to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

KOEHRING HEAVY DUTY

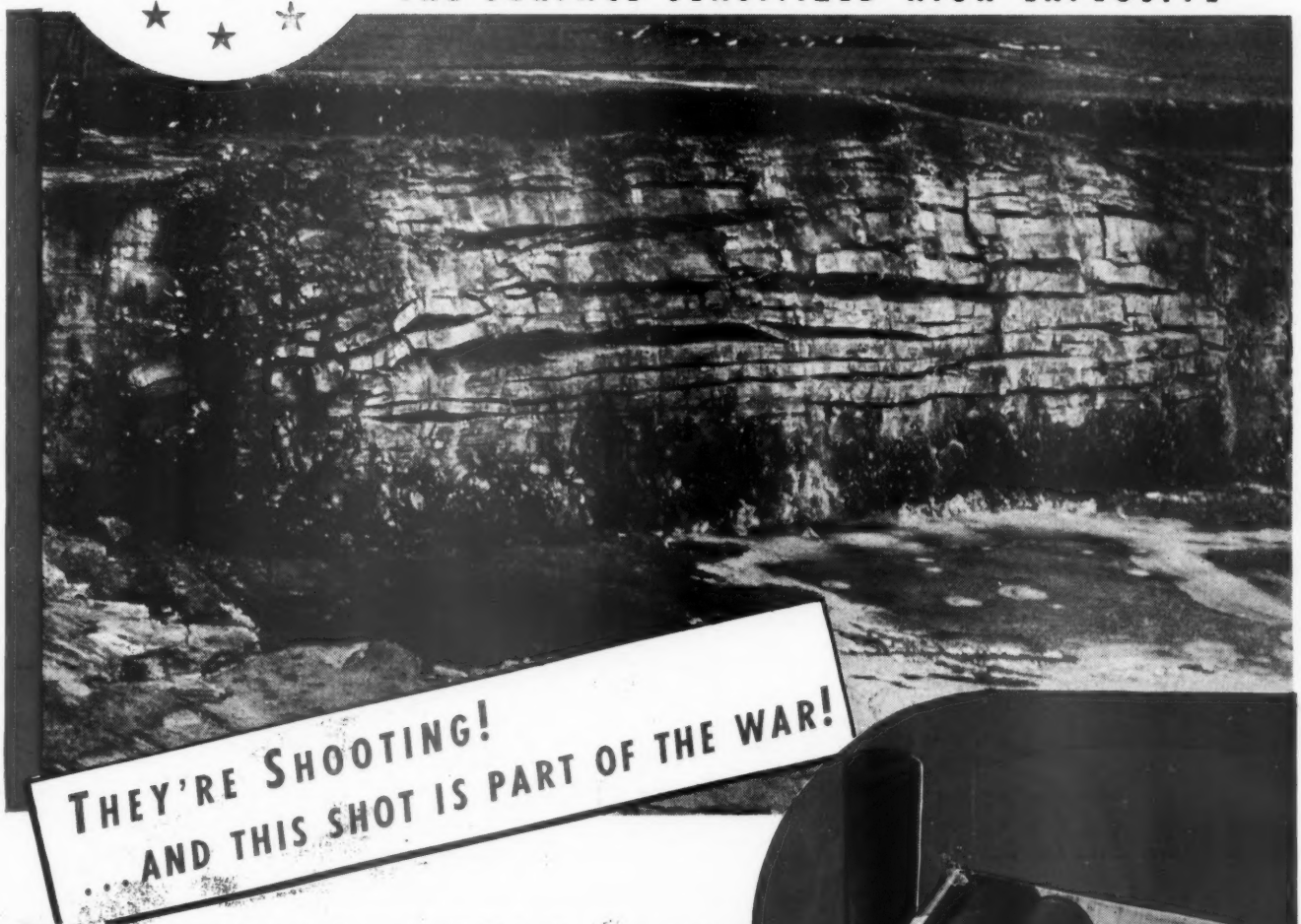
HEAVY-DUTY CONSTRUCTION EQUIPMENT

KING EXPLOSIVES

It's

DETONITE

THE SURFACE SENSITIZED HIGH EXPLOSIVE



THEY'RE SHOOTING! ...AND THIS SHOT IS PART OF THE WAR!

THIS unretouched photograph of Detonite, the surface sensitized high explosive, going into action was taken in a northern Ohio quarry. But the explosion is as much a part of this shooting war as if it came from a land mine in Africa or a depth-charge in the Atlantic. For today this quarry-operator—and many others like him—is confidently depending upon Detonite to help him play his part in the war.

Your war job, too, will move faster, when you enlist King Detonite—the modern, proved, patented quarry explosive—in your ranks. Wear and tear on your equipment is minimized and many users report substantial savings in explosive costs. Complete stocks of King Detonite, Standard Dynamites and accessories are available for immediate delivery from conveniently located magazines.

THE KING POWDER CO. INC.
CINCINNATI, OHIO
INCORPORATED 1878

Let Us Prove King Detonite to Your Satisfaction in Your Own Quarry!

★ MEETS WAR DEMANDS

★ BUY WAR BONDS

Cedarapids

Built by IOWA

THERE is a rumble through the night. The headlights of another truck stab the darkness that envelops the stock piles by the railroad tracks. It rattles emptily under the discharge to take its batch of sticky black top and it rumbles heavily away again with several square yards of airport runway in the raw, mixed and produced by American ingenuity as typified by Iowa Cedarapids Asphalt Plants.

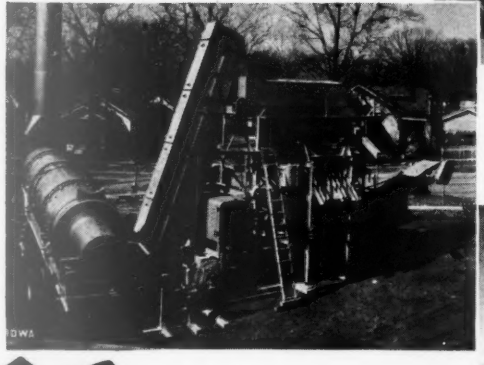
Hour after hour, through the night and day, the trucks rattle up and rumble away and the ribbons of black runway roll out behind them. 53,000 tons in 44 days operating two 10 hour shifts a day — at an average of 85 tons an hour. That's the kind of service this Cedarapids Asphalt Plant gave Koss Construction Co., of Des Moines, Iowa at Perry, Oklahoma.

That's the kind of service Cedarapids asphalt plants are giving all over the country.

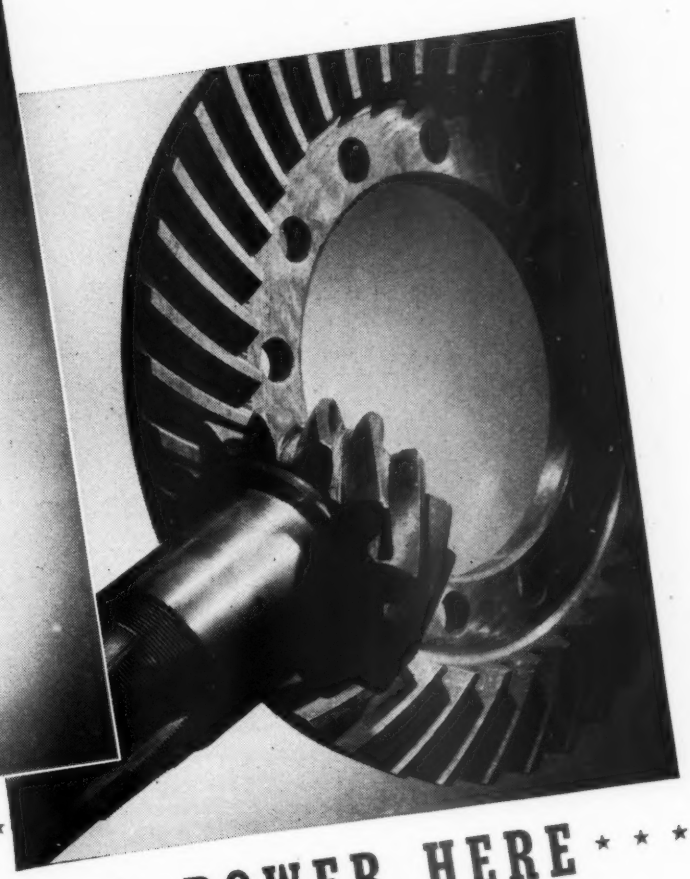
There is a time coming when we will again be a free people — free to come and go and enjoy the natural richness of a great nation. It will call for highways, airports, dams and buildings. People are going to go places. When that time comes the dependable wartime service that Iowa Cedarapids plants give can be the difference between successful and unsuccessful contracts. Come to headquarters for aggregate producing equipment.

for KOSS CONSTRUCTION COMPANY
Des Moines, Iowa

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa



A Capacity for every problem



LESS WEAR HERE ★ ★ ★ MORE POWER HERE ★ ★ ★

at the same time

RING-FREE REMOVES CARBON

This is no time to let carbon and unnecessary wear waste hard-to-replace parts . . . waste fuel . . . waste productive horsepower. Lubricate your power plant more efficiently with Macmillan RING-FREE Motor Oil. By reducing friction *fast*, RING-FREE delivers direct to the driveshaft more of the horsepower ordinarily wasted in overcoming motor friction. And in addition, it actually removes carbon while the engine runs! Carbon removal is a natural RING-FREE function, inherent in the crude oil and retained by the exclusive Macmillan patented refining process. To remove carbon . . . to minimize "downtime" . . . to get maximum fuel conservation . . . and to get all-out performance — start using RING-FREE now!

Macmillan RING-FREE Motor Oil combines these vital qualities: **1**—Removes Carbon, **2**—Reduces Friction *Fast,* **3**—Saves Fuel, **4**—Has Great Film Strength, **5**—Has High Heat Resistance, **6**—Long Cling to Metal, **7**—Fast Penetration, **8**—Is Non-Corrosive, **9** — Is Less Affected By Dilution.

MACMILLAN PETROLEUM CORP.

50 W. 50th St., New York • 624 S. Michigan Ave., Chicago • 530 W. Sixth St., Los Angeles

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MACMILLAN RING-FREE MOTOR OIL

REDUCES WEAR BY REDUCING FRICTION

Any Of These Problems Bothering You?

Truck Shortage—
Gas Rationing—
Tire Rationing—
Manpower—
Limited
Production—

★ The Dempster-Dumpster system of materials handling has been a "life-saver", so to speak, for many quarry, cement, sand, gravel and other industrial plants during recent years. This is easily understood, once you realize the big job the Dempster-Dumpster is capable of.

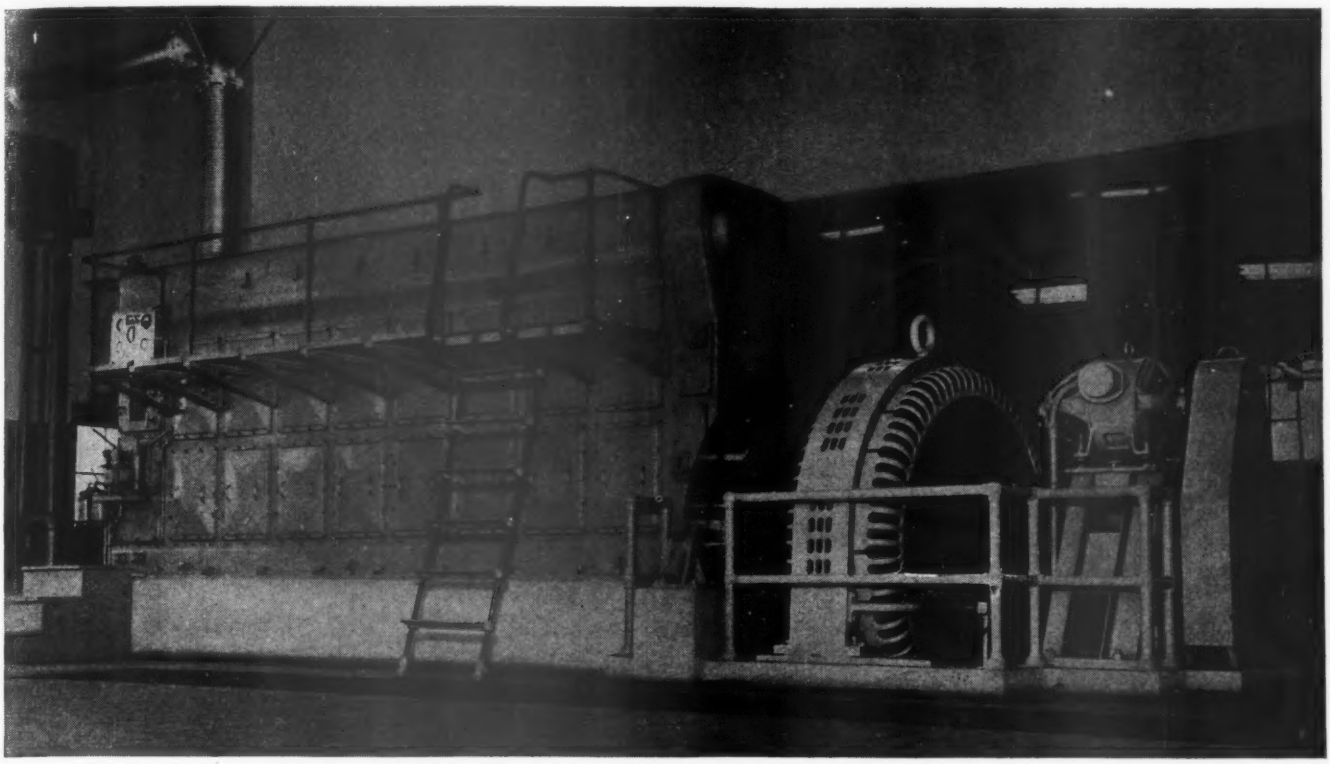
To see it in operation, no stretch of the imagination is necessary to convince you at once that one truck, equipped with a Dempster-Dumpster Hoisting Unit, will do the same work of 3 to 5 of your present trucks. This one truck is on the go—giving maximum service—in a never ending cycle, hoisting, hauling and dumping one loaded body of material while any required number of other bodies are being loaded. A synchronized system of haulage that saves trucks, tires, gas, time, manpower and money.

The above illustrations show clearly how the Dempster-Dumpster system works at the loading point. No tracks to lay and move around. Empty bodies are placed exactly where they will be most conveniently loaded. No time is wasted by men or equipment.

Let our engineers assist you in simplifying haulage of material in your operation. Write for completely illustrated catalog NOW. Dempster-Brothers, 173 Springdale—Knoxville, Tennessee.

DEMPSTER DUMPSTER
TRADE MARK REG.

"There's a DEMPSTER-DUMPSTER Built For Every Material Handling Job."



Superior Stationary Diesel at the Dolle Co., Gibsonburg, Ohio.
1—8 cylinder 12½" bore x 16½" stroke. 625 H.P.—400 R.P.M.

Quarrying Limestone for America's Fighting Steel Calls for Dependable Power

MANY and diversified are the war-time responsibilities charged to Superior Diesel Engines.

More than ever, quarries and rock crushing plants are depending on the proven toughness and economy of Superior Diesel Engines to help provide limestone that goes into the making of steel for guns, tanks and battleships.

Superior's fine record for dependable low cost power is as remarkable as the greatly diversified number of jobs these internationally famous Diesels have been called upon to perform. In hundreds of installations, modern, self-contained Superior Diesels have conclusively demonstrated their ability to furnish uninterrupted power for practically every branch of American industry.

SUPERIOR ENGINES

Division of The National Supply Co.

Executive Offices: Pittsburgh, Pa.

Sales Offices: Toledo, Ohio; Springfield, Ohio; Fort Worth, Texas; Tulsa, Oklahoma; Torrance, Calif. Export: The National Supply Corporation, 30 Rockefeller Plaza, New York, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C.2.

TRY THIS!

And Prove for Yourself That BEMIS MULTI-WALL PAPER BAGS Have Extra Strength Needed For Wartime Storage and Shipping

Place two filled Bemis Multiwall Paper Shipping Bags so that they are supported only by their ends. Then continue to pile filled bags on top of them. (The stack will get pretty high before those Bemis Multiwalls give way!)

This unusual experiment will show you the extra toughness of Bemis Multiwalls which enables them to withstand the severe hardships of wartime handling.

Exacting quality control plus Bemis manufacturing methods maintain this extra strength factor in spite of wartime restrictions and raw material difficulties.

Take advantage of Bemis quality and service when you reorder. Samples will be sent for testing without obligation.

Photograph of actual test made at the Arthur Ruprecht Sand & Material Co., St. Louis, Mo.

BEMIS BRO. BAG CO.

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala.
San Francisco, Calif. • Wilmington, Calif. • St. Helens, Oregon

Baltimore • Boston
Brooklyn • Buffalo
Charlotte • Chicago
Denver • Detroit
Houston • Kansas City
Indianapolis • Los Angeles • Louisville
Memphis • Minneapolis • New Orleans
Norfolk • Omaha
New York City • Oklahoma City • St. Louis • Salina • Seattle
Salt Lake City • Wichita

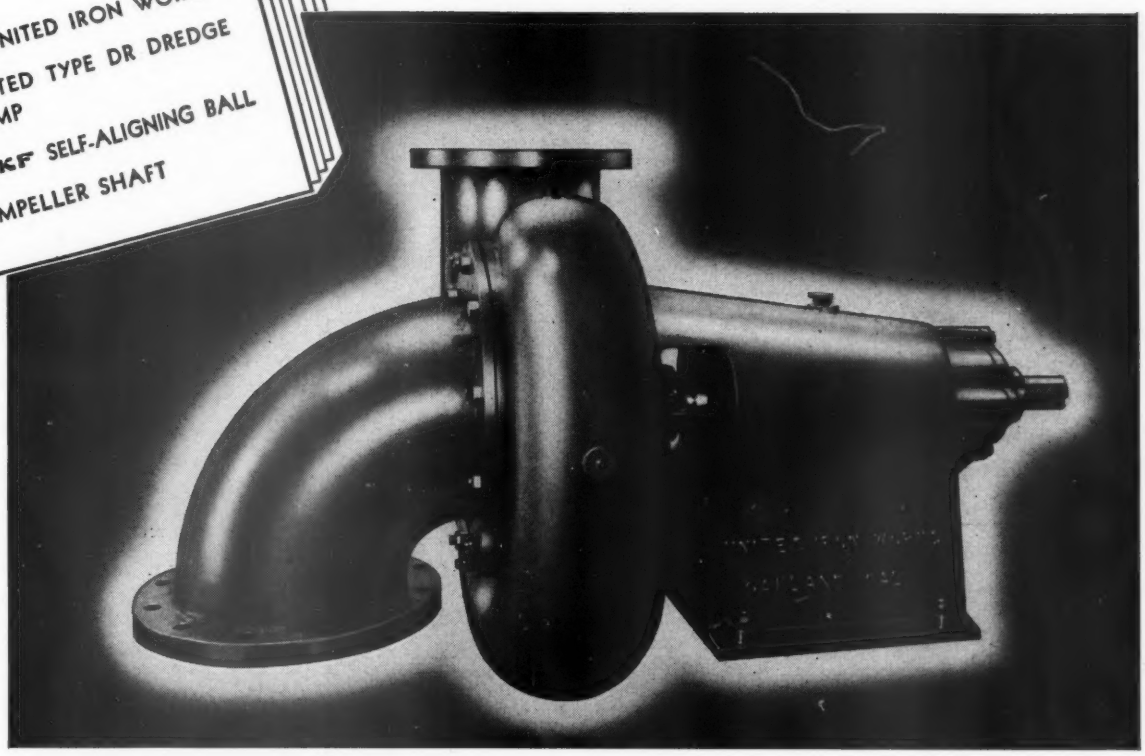
APPLICATION

Manufacturer UNITED IRON WORKS

Machine UNITED TYPE DR DREDGE PUMP

Bearings SKF SELF-ALIGNING BALL

Location IMPELLER SHAFT



PUMPS *move sand faster*

WITH SKF BEARINGS

Bearings that stand up for years are the kind of bearings used on the impeller shaft of this United Type DR Dredge Pump. Bearings that insure smooth continuous performance as this pump, driven by a 50 h.p. motor turning at 850 r.p.m., picks up sand and silt from river bottoms . . . bearings that take varying radial and thrust loads without faltering. You know these bearings well. They're the same make of bearings used on guns, tanks, planes and other weapons as well as on the machines that make them. They're SKF Bearings. 5330

SKF INDUSTRIES, INC., PHILADELPHIA, PENNA.

ARMY E NAVY

WIRE ROPE FIGHTS AT SEA

TRAPPING U-BOATS

When a Nazi U-boat sneaked into Scapa Flow and blasted Britain's big carrier *Royal Oak* to the bottom, the loss underlined the fact that to block U-boats out of a harbor, you've got to lock it up tight—not just with mines but with elaborate nets made of strand. Keeping harbors closed to undersea marauders is one of Bethlehem's war-time jobs. Our wire-rope mill has been turning out large quantities of harbor-defense strand—a high-strength strand of special construction, and with the famous bethanized electrolytic zinc coating.

TOSSING FIGHTERS INTO ACTION

An aircraft carrier, as everybody knows, houses its fighter planes and bombers on the hangar deck, which is directly beneath the flight deck. When an attack alarm comes in, those planes must get from hangar deck to flight deck and into the air in almost less time than it takes to tell about it. Special Bethlehem wire rope is used in the high-speed plane lifts of some of America's biggest carriers.

TOWING DAMAGED FREIGHTERS

Every cargo vessel in a convoy is now equipped with two husky towing hawsers, installed in such a way that they can be rushed into action at a moment's notice. If a vessel is struck and crippled by a torpedo, one of the emergency towing hawsers is attached to a sister ship and the damaged vessel is brought safely into port. Bethlehem has had a lot of peacetime experience in building strong, corrosion-resistant towing hawsers. United Nations' convoys are benefiting from that experience now.

★ ★ ★

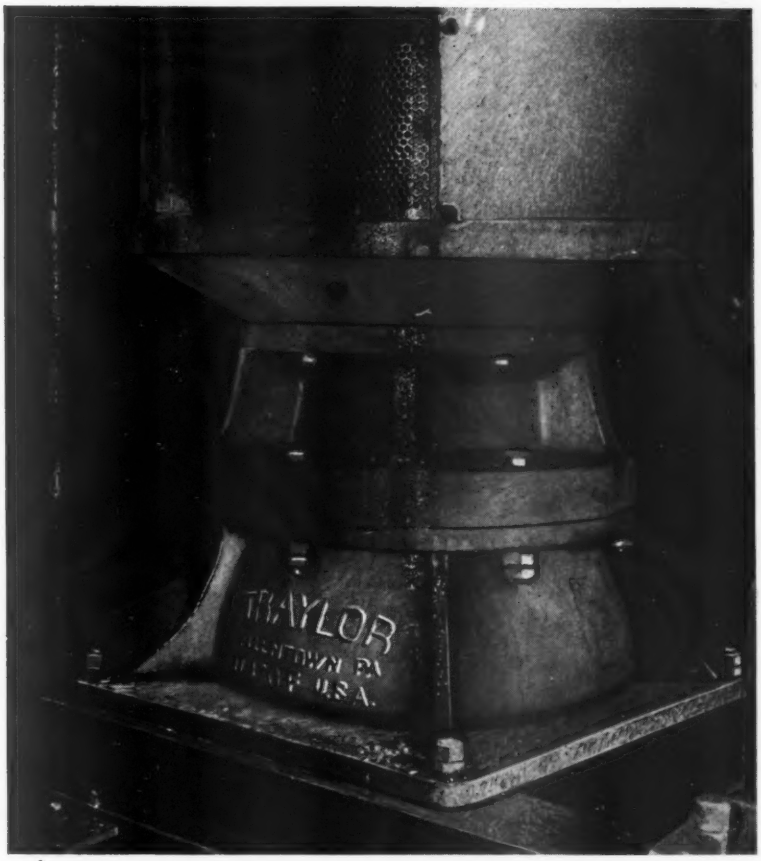
In hundreds of jobs on sea and on land—ships' rigging, aircraft-control cord, minesweeping cable, mine-anchor cable, and naval dredge rope, to name a few—Bethlehem Wire Rope is helping to win the war. There are also pressing needs for Bethlehem Wire Rope on the home front—in war factories, mines, timber lands, construction jobs, and oil fields. We are doing our level best to keep everybody adequately supplied. The job is enormous. If you have to wait to get delivery on your rope, we hope you'll keep that in mind, and bear with us.

Bethlehem Manufactures Wire Rope for all Purposes

TRAYLOR

Type TY

REDUCTION CRUSHER



WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

The Traylor Type TY Reduction Crusher embodies the four characteristics that hard-headed operators demand —(1) it delivers the exact kind of product required, of the right size, and in satisfying capacity; (2) it has strength enough, and to spare, to stand up under its job (built of steel throughout); (3) it extracts the ultimate value from wearing metal (the patented Bell Head and Curved Concaves assure this), it is inexpensive to maintain otherwise (automatic force-feed lubrication), and it is economical in the use of power (cut gearing and roller bearings); (4) it is foolproof (taken care of by protection against dust and tramp metal).

The TY pictured above is doing a great job at a big mid-western gravel plant — has been on the job for over seven years, in fact, without fuss, needing few repairs except the normal replacement of wearing parts that have more than earned their cost in the production of exceptionally large tonnages. This installation is typical of many hundreds of Traylor Type TY Reduction Crushers being used in stone plants, gravel plants, cement plants, chemical plants and mining — in the United States, Canada, Central and South America, Europe, Asia and Australia. Many of these crushers are re-orders — the best O. K. there is! What the TY has done for these users, it can do for you. We can sell to you, if you are able to supply the priority. Write us—today!

SEE BULLETIN 3112

TRAYLOR

ENGINEERING & MANUFACTURING CO.

MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

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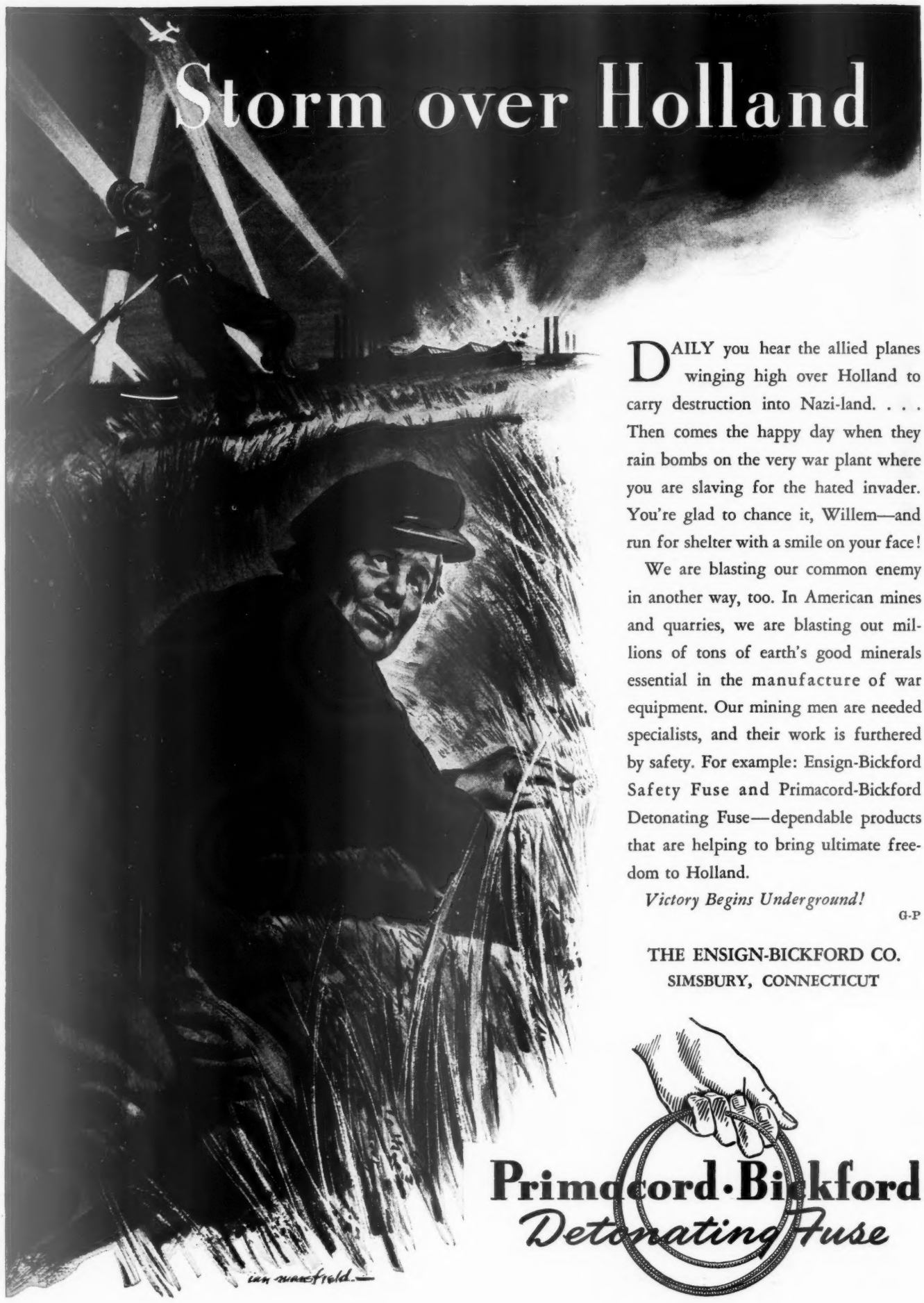
B. C. EQUIPMENT CO., LTD.
551 Howe St., Vancouver, B. C.

Export Department — 104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Rio de Janeiro, Buenos Aires, Santiago, Autofagasta, Oruro, Montevideo.



DAILY you hear the allied planes winging high over Holland to carry destruction into Nazi-land. . . . Then comes the happy day when they rain bombs on the very war plant where you are slaving for the hated invader. You're glad to chance it, Willem—and run for shelter with a smile on your face!

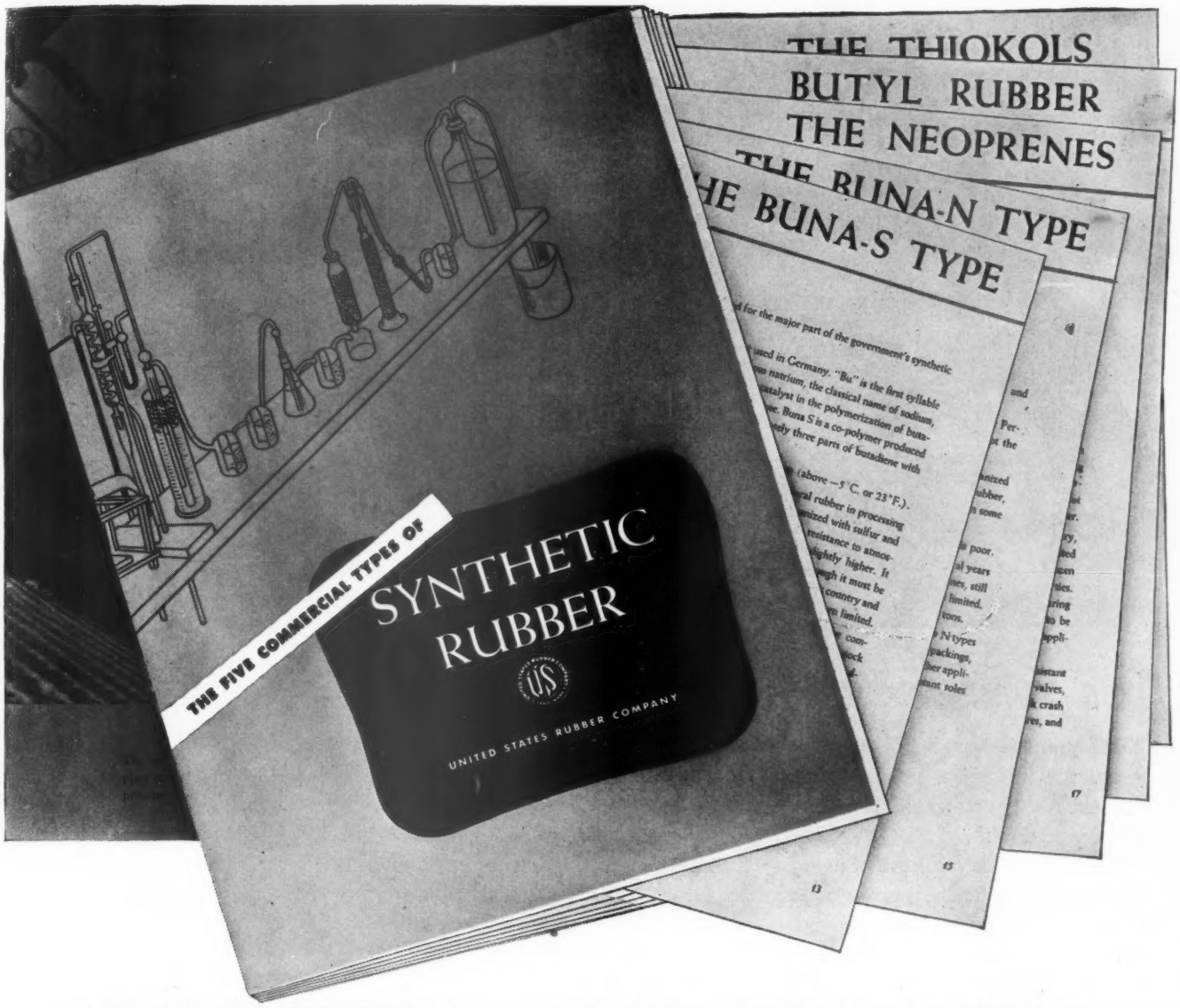
We are blasting our common enemy in another way, too. In American mines and quarries, we are blasting out millions of tons of earth's good minerals essential in the manufacture of war equipment. Our mining men are needed specialists, and their work is furthered by safety. For example: Ensign-Bickford Safety Fuse and Primacord-Bickford Detonating Fuse—dependable products that are helping to bring ultimate freedom to Holland.

Victory Begins Underground!

G-P

THE ENSIGN-BICKFORD CO.
SIMSBURY, CONNECTICUT

Primacord-Bickford
Detonating Fuse



WHAT IS SYNTHETIC RUBBER? HOW IS IT MADE? WHERE IS IT USED? HOW DOES IT COMPARE WITH NATURAL RUBBER? *You'll find the answers in this new book*

As the supply of natural rubber diminishes, undoubtedly more and more mechanical goods will be made of synthetic rubber... hose, belts, packings, molded goods, tank linings, and other rubber products used by industry.

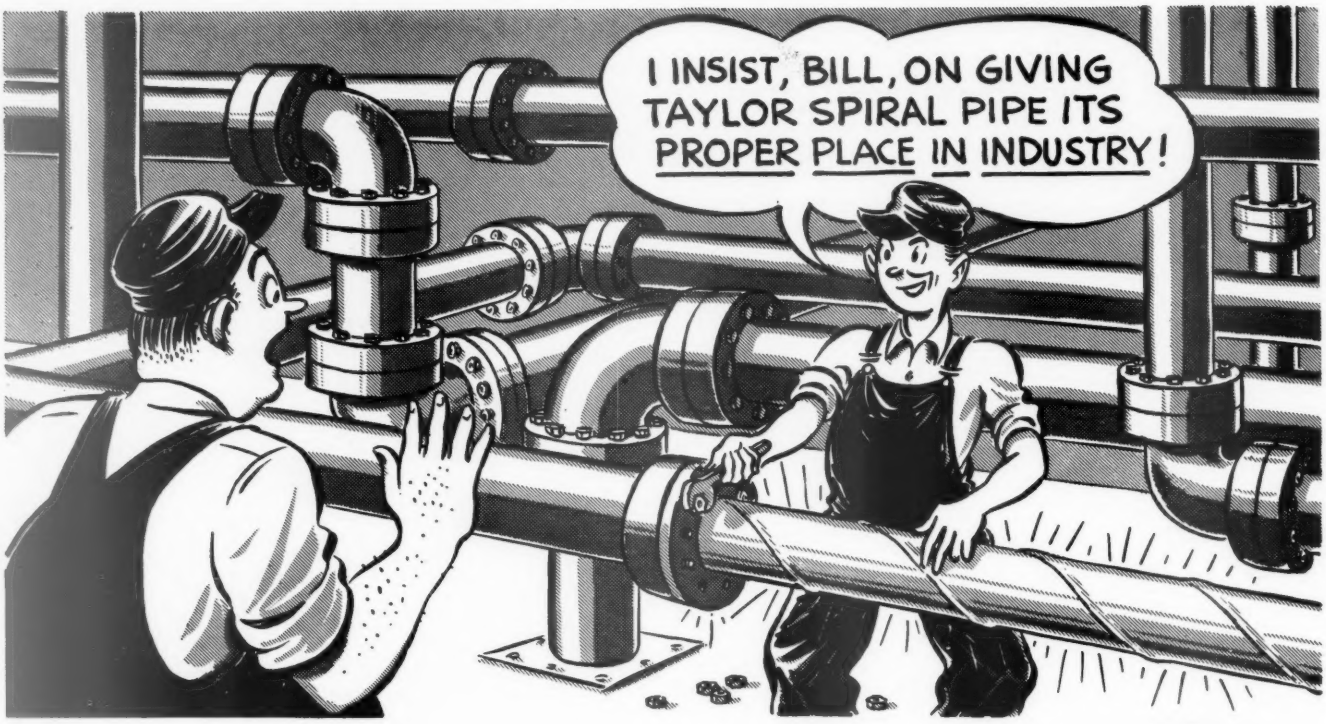
Having worked in the field of synthetic rubber for more than twenty years, we know what each of the five types will do; what chemicals such as sulfur, carbon-black, or ultra-accelerators must be added, and how to compound them. We work with all five types; use the type available that is best suited for the purpose.

You can get an over-all picture of the properties and characteristics of synthetic rubber in the new book recently published by United States Rubber Company. A request for "The Five Commercial Types of Synthetic Rubber" made on your company letterhead will be filled promptly. Address your letter to Dept. 16

UNITED STATES RUBBER COMPANY

Listen to the Philharmonic Symphony program over the CBS network, Sunday afternoon 3:00 to 4:30 E. W. T. Carl Van Doren and a guest star present an interlude of historical significance.

1230 SIXTH AVENUE · ROCKEFELLER CENTER · NEW YORK
IN CANADA: DOMINION RUBBER COMPANY, LTD.



It's never too late to change

THE point is that heavy pipe is great stuff when you *need* it, but just a way of wasting dollars when you *don't!*

There isn't much danger of using light-wall pipe when heavy pipe is needed; for requirements are always carefully calculated when service conditions are extreme. But there *is* danger of using heavy pipe when it is *not* needed; for when it comes to the ordinary run of moderate or low pressure piping the time-honored custom is to use Standard Weight Pipe as though it were the bottom rung on the ladder of available pipe thicknesses.

Actually, Standard Thickness is fairly high on that ladder. Eight and ten inch Standard Thickness Pipe, for instance, has a rated bursting strength around 3,000 lbs. per square inch. Obviously this is *far* stronger pipe than is needed for the large majority of piping requirements — for uses like those listed opposite.

Hundreds of applications prove that light-wall-but-strong Taylor Spiral Pipe will handle this broad band of piping needs with strength and service life to spare. It will cut the installed cost in half in many cases; and, equally important today, it conserves vital steel.

Changing to Taylor Spiral Pipe for services like those listed is made easy by the complete range of sizes and wide variety of fittings. Thicknesses range from 18 to 6 gauge; sizes from 4" to 42"; joint lengths up to 40 ft. All types of end joints and couplings, all kinds of fittings and specials or fabricated assemblies, are produced by Taylor Forge, assuring a complete service and undivided responsibility.

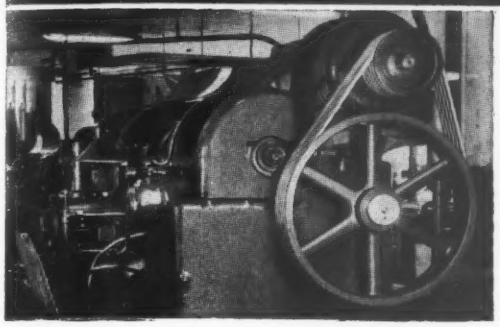
Change to TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines.
- Low Pressure Steam and Air Lines.
- Steam and Diesel Exhaust Lines.
- Vacuum and Suction Lines.
- Blower Piping.
- Sand and Gravel Lines.
- Industrial Gas Lines.
- Oil and Gas Gathering Lines.
- Swing Pipe.
- Spray Pond Piping.
- Hydraulic Mining.
- Dredge Lines.

TAYLOR FORGE & PIPE WORKS, General Offices & Works: Chicago, P. O. Box 485
NEW YORK OFFICE: 50 CHURCH ST. • PHILADELPHIA OFFICE: BROAD ST. STATION BLDG.

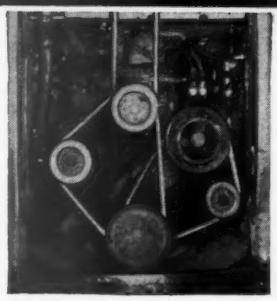
TAYLOR *Spiral* PIPE

In Use for Years by Leaders of U. S. Industry



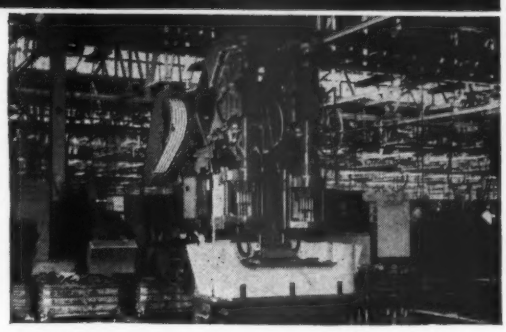
In a
Leading Machine-Parts Plant—

belts on screw machines and grinders are subjected to a severe oil condition. GATES special synthetic belts were adopted 100% for this severe service after months of testing proved that they last three times as long as any rubber belt ever used.



A Large User of
Rear Engine Coaches

could get only 13,000 to 14,000 miles from natural rubber belts in rear engine coach and bus service where rapid and frequent acceleration and deceleration create high temperatures. GATES special synthetic belts are giving double the life in this demanding service.



This
Outstanding Aircraft Factory

—one of the nation's leaders—has found that Gates special synthetic belts last three to four times as long as regular rubber belts on machines where the belts are badly exposed to oil.

GATES
Heat and *Oil* V-BELTS
of *Special* Synthetic Rubber

Are Giving **Up to 230% Longer Life than natural rubber belts when subjected to heat and oil . . . Initial cost at present is higher . . . recommended to meet especially severe oil and heat conditions.**

Gates has been building V-belts with synthetic rubber for many years. Thousands upon thousands of Gates V-belts without an ounce of natural rubber in them have now seen years of service in many of the nation's leading industrial plants.

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PIT AND QUARRY

Vol. 36 JULY, 1943 No. 1

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PIT AND QUARRY

CHICAGO JULY, 1943

E. C. Champion, Lone Star Superintendent 14 Years, Retires

Edmund C. Champion, superintendent of the Lone Star Cement Corporation plant at Nazareth, Pennsylvania retired on July 1, after over twenty years service with that corporation.

E. C. Champion

Born near Three Rivers, Michigan in 1877, Mr. Champion graduated from the University of Michigan in 1899 and was given a Master of Science degree in 1900. The last two years of his attendance he was an assistant in the chemical and metallurgical laboratory at the university.

Just 43 years ago, on July 1, 1900, he went to Iola, Kansas and joined the organization that was putting in operation the first cement plant equipped with rotary kilns west of the Mississippi River. This was also the first cement plant to use natural gas as fuel.

After eleven years at Iola, Mr. Champion went east and was with the Atlas Cement Company and the American Agricultural Chemical Company for a number of years.

He has been in charge of the Lone Star plant at Nazareth for the past fourteen years and has continued in service a year and a half beyond the retiring age established by the Corporation.

McCall Again Heads Ohio Stone Producers

The annual meeting of the Ohio Crushed Stone Producers, Inc., was held recently at Findlay, Ohio. E. W. McCall of the Tarbox-McCall Stone Company, Findlay, was re-elected president, E. V. Ansbach of Toledo, vice-president, and Dr. William B. Guitteau, Toledo, executive secretary.

Lehigh Workers Back After 25-Day Strike

Settlement of a strike of 200 employees of the Lehigh Portland Cement Company at Mitchell, Indiana, was effected June 8 and work was resumed the following day.

The strike, which was said to have involved the seniority rights of one worker, who was dismissed from his job, had kept the Lehigh quarry idle since May 14. Plant workers joined the quarry workers on May 20. Harold Connerly, president of the Mitchell local of the United, Cement, Lime & Gypsum Workers' Union (AFL) said a tentative agreement had been reached whereby the strikers returned to their jobs, with negotiations toward final settlement to continue.

Prospect for Magnesite on Washington Tract

The Sullivan Machinery Company is prospecting the old Double Eagle mine 13 miles southwest of Valley, Washington, to determine the extent and importance of the magnesite deposits on that property. The owners are said to be Minneapolis and Spokane interests who have about 300 acres in that vicinity.

Indiana Stone Operator to Re-Open Old Quarry

The Phillips Stone Company is operating its quarry at Elberfeld, Indiana full time and Arley Phillips, manager, announces that the company has started to grind limestone. Mr. Phillips also states that the company will re-open an old quarry north of Boonville, Indiana, in operation within a short time.

Mile-Long Tramway Transports Asbestos in Green Mountains

A mile-long aerial tramway is being constructed to transport asbestos rock along the side of one of the Green Mountains from a newly-opened asbestos deposit near Lowell, Vermont, to the mill of Vermont Asbestos Mines, division of the Ruberoid Company, at Eden, Vermont.

Expected to go into operation in July, the tramway will transport approximately 2,500 tons of rock a day, and will, according to the announcement, insure for the company uninterrupted operation of its facilities at Eden, where it has been operating at capacity an open-pit mine and well equipped mill for many years. The process of mining, transporting, and milling the rock obtained from the Lowell deposits will be virtually continuous.

The ore, after quarrying, will be loaded by electric shovels into tractor-powered cars for transporting to crushers, which will reduce the ore in size for loading into the cars of the aerial tramway.

Upon arrival at the Eden mill, the crushed ore will be passed through rotary driers to remove excess moisture, after which it will be given a final crushing to reduce it to the proper size for milling.

Finally the ore will be carried by mechanical conveyors to the mill for separation of the fiber from the mother rock, which then requires fiberizing and grading, the longest fibers being the most valuable.

A recent survey, including extensive core drilling, indicated that the asbestos deposits served by the tramway are sufficient to keep the existing mill operating at capacity for many years.

Buy War Bonds and Stamps

Agricultural-Stone Demand in Illinois Far Exceeds Supply

A survey just completed of 12 counties in western Illinois reveals a growing "mortality" in the number of producing limestone quaries, according to the soil improvement department of the Illinois Agricultural Association.

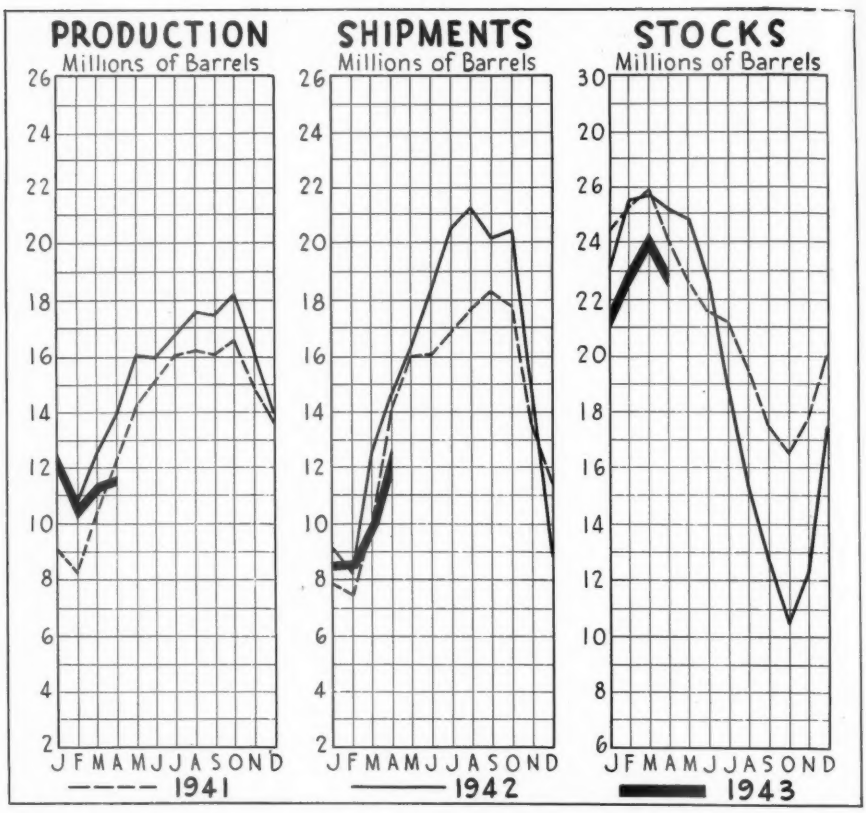
In 1941, this area had approximately 51 quarries producing agricultural limestone for sale to farmers. There are at the present time, only 27 quarries in operation, the IAA department reports. These figures indicate a reduction of about 47 per cent. in number, but that does not tell the entire story, since several in the group of 27 now have reduced production because they lack the manpower to "get out" all of the rock their equipment is capable of crushing.

Two years ago, the department reports, Henderson County had six various sized operations ranging in output from 40 to 275 tons per day, with a total daily potential production of 750 tons. Today there are two, one near Lomax and one at Gladstone, with a total daily potential production of approximately 350 tons. McDonough has one limestone producer compared with two formerly; Hancock—two and formerly five; Schuyler—none compared with one; Brown — three against five; Scott—none compared with four; Adams—five compared with seven; Pike—eight compared with ten; Green and Jersey—one each where formerly there were three. Calhoun County's figure of three remains unchanged.

The above approximate figures are conservative, the department reports, as several operators stated they were "going to run" but due to weather, lack of repairs, labor, etc., had not yet started but are listed as "active" quarries. Then, too, the small local quarries ordinarily operate only a part of the year during a time that fits in with their farming operations.

Better paying jobs, entrance of men into the armed forces, and expanded farming operations are the reasons most often given by operators for the labor shortage.

All operators agree on the tremendous demand for agricultural limestone and as a Warren County operator said, "The demand is three to four times what we can produce." In the Quincy area, higher-paying war jobs have drained many men from the three long-established limestone producing plants and there is heard again the truism—"How can we pay increasing wages and rates with ceiling prices on our limestone?", the IAA soil improvement department reports.

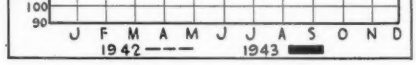


The Portland-cement industry in April, 1943, produced 11,239,000 barrels, shipped 12,757,000 barrels, and had in stock at the end of the month 22,593,000 barrels of cement, according to the Bureau of Mines. These represented declines of 20, 14, and 10 per cent., respectively, from April, 1942.

Transit-Mix Company Will Produce Gravel

Miller-Burroughs, Inc., of Flint, Michigan, has filed articles of incorporation with the state corporation and securities commission at Lansing, Michigan. The company will operate a sand-and-gravel plant. Capital consists of $50,000 common stock.

The incorporators are the Burroughs Transit Mix Company of Flint and Howard Miller.


MONTHLY LIME SHIPMENTS, 1942-1943
AS REPORTED TO NATIONAL LIME ASSOCIATION
Thousands of Barrels
J F M A M J J A S O N D
1942
1943

According to data collected by the National Lime Association, 65 companies in April, 1943, shipped 186,967 tons of lime (119,686 quicklime; 67,281 hydrate). Reporting companies represent 44 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 480,000 tons. Shipments of lime by users for April, 1943, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	4,381	23,338
Building	8,889	20,478
Chemical	106,416	23,465
Total	119,686	67,281

Paid Circulation of Pit & Quarry Among Nonmetallic - Mineral Producers In Recent Years:

1942	(November)	6,650
	(May)	6,513
1941	(November	6,179
	(May)	5,945
1940	(November)	5,397
	(May)	5,037
1939	(November)	4,641
	(May)	4,617
1938	(November)	4,496
	(May)	4,366
1937	(November)	3,971
	(May)	3,772
1936	(November)	3,654

CONTINUOUSLY FOR 26 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

82% increase in 6 Years

Henry D. Titsworth, Chairman of Glens Falls Board, Dead

Henry H. Titsworth, 68, chairman of the board of the Glens Falls Portland Cement Company, died June 10 in Richmond, Virginia, after a long illness. He had residences at Randolph, Virginia, and Glens Falls, New York.

Born in Westfield, Massachusetts, Mr. Titsworth was graduated from Amherst College in 1897. He was formerly president of the Clay Products Company of Brazil, Indiana, and at one time was in the publishing business with D. C. Heath, Ginn & Company, and the MacMillan Company. He also had been manager of the industrial engineering division of the Sanderson & Porter Company and was associated with Tucker, Anthony & Company, investment brokers in New York.

During the First World War he was a member of the Council for National Defense and the War Industries Board.

New Magnesium Plant Operating at Spokane

The first of the units of the new government-owned magnesium plant at Spokane, Washington went into operation during the last week in May, the Aluminum and Magnesium Division of the War Production Board has announced.

The plant is being built and operated by the Electro Metallurgical Company, a subsidiary of the Union Carbide and Carbon Corporation, for the Government's Defense Plant Corporation.

SHARE YOUR PIT AND QUARRY

● When you have finished with your copy of Pit and Quarry please pass it to someone else in your organization. By doing so you will not only be helping him by making the information it contains available to him, too, but you will also be helping your government which, because of the shortage of manpower, has been forced to place limitations on the use of paper by magazine publishers. We shall, of course, continue to send Pit and Quarry regularly to you and to all other subscribers. But we suggest this simple method of making Pit and Quarry available to a larger number of men at a time when the information it provides is most urgently needed and without increasing our consumption of paper.

UNITED STATES TREASURY DEPARTMENT

For distinguished services rendered in behalf of the War Savings Program this citation is awarded to

Pit and Quarry

Given under my hand and seal on June 9, 19 43

Henry Morgenthau Jr.
SECRETARY OF THE TREASURY

The citation reproduced above has just been awarded to "Pit and Quarry". An accompanying letter signed by Thomas H. Lane, chief of the advertising section, War Savings Staff, Treasury Department, reads: "It gives me great pleasure to transmit to you the inclosed citation, signed by the Secretary of the Treasury, in recognition of the outstanding service rendered by your publication to the War Bond campaign."

Completed in just 11 months from the time construction work was started, the new plant is the first and largest completely integrated mill for the production of magnesium from dolomite by a thermal reduction method. Capacity of the plant, when it is in full operation by the end of this year, will be approximately four times the entire annual pre-war production of the entire United States.

The metallic magnesium to be produced in the Spokane plant will draw on raw materials found in the region. The method for the production, and the furnaces and equipment were designed by the Electro Metallurgical Company. In this process, calcined dolomite is smelted with ferrosilicon in large electric furnaces. Dolomite is abundant in the Spokane region, while the large amount of electric power required is obtained from the Grand Coulee Dam hydro-electric development.

Gypsum Sales Decline Less Than Expected

Production of gypsum and sales of most gypsum products in the January-March period of 1943, reported to the Bureau of Mines by producers, showed a less pronounced slump from data of the similar period of 1942 than was indicated by the decreased activity of construction.

The overall decline in activity for the industry from the first quarter of 1942 is measured best by the 20-per cent. decrease in crude gypsum mined and the 33-per cent. slump in output of calcined gypsum. In contrast, residential construction, according to Department of Commerce estimates, was 44 per cent. below January-March 1942. This relatively favorable showing for the gypsum industry is traceable primarily to the strong demand for wallboard and laminated board in wartime construction which requires easily-erected, prefabricated materials.

Sales of cement retarder reflected the declining activity of the Portland cement industry and were 11 per cent. below those of January-March 1942. The increased consumption of agricultural gypsum was due entirely to the strong demand in California. Sales of land plaster in the southeastern states fell off sharply from the first quarter of 1942.

Stuart Made President of Yosemite Portland

At a recent director's meeting, Theodore M. Stuart, San Francisco attorney was elected president and general manager of the Yosemite Portland Cement Company, succeeding A. Emory Wishon. He has been a director of the company since 1934.

In tendering his resignation, Mr. Wishon said that present conditions prevented him from giving the amount of time to his duties the position requires. He continues, however, as a director and member of the executive committee.

Save Wire Rope by Proper Application of Clip Fasteners

The clip fastening shown in the accompanying picture is materially weakened because of the way the clips have been applied to the wire rope. Unfortunately, it is no worse than hundreds of other clip fastenings made by rope handlers who are either careless or just don't know any better. And in these days when replacements of wire rope or other equipment are hard to get, and machine shutdowns are more costly than ever before in all history, clips are mighty important.

What's wrong with the application?

1. The clips are staggered instead of all being applied with the base, or saddle, against the pulling rope and the U-bolt against the short end.

2. The short end between the two top clips is slack and can't take any of the load; hence, the top clip is useless, and we have the equivalent of only a three-clip fastening.

3. The bolts on the top clip have obviously been drawn too tight, thereby misshaping and weakening the rope at this point, and still further reducing the efficiency of the fastening.

4. The two middle clips are too close together. The clips should be evenly spaced at about six times the rope diameter or more.

The clips should not be drawn up too tight against the rope, but neither should they be allowed to become loose. With the clips fastened, all the nuts should again be tightened after the rope has been put under tension. The clips should be tightened with every rope inspection.

Wrong way of applying wire-rope clips.

When inspecting clip fastenings, it is extremely important to examine the rope at the last clip farthest away from the loop or bight, as fatigue breaks often develop at this point due to the fact that rope vibration or whipping is dampened here. Fatigue damage is less pronounced with preformed wire rope, which may be explained by the reduced tendency of preformed rope to vibrate or "whip", this type of rope being more flexible and not so "springy" as non-preformed.

It is important to apply a sufficient number of clips, and the minimum number recommended for different sizes of rope is as follows:

Rope Diameter Inches	Number of Clips	Spacing of Clips Inches	Length of Wrench Inches
½ to ⅝	3	3	12
¾ to ⅞	4	4½	18
1 to 1⅛	4	6	24
1¼ to 1⅜	4	7	24
1½ up	5 to 7	10	24

Sand Found Best for Stemming Drill Holes

Recent tests by the Bureau of Mines regarding the efficiency of various types of stemming for 40 per cent. ammonia gelatin dynamite in blasting rock indicate that sand is the best material for confining explosives to boreholes under conditions in which the experiments were conducted.

A report prepared by John A. Johnson, mining engineer in the Bureau's Safety Division, and Wing C. Agnew, superintendent of the Bureau's Mt. Weather Testing Audit, near Bluemont, Virginia, describes the use of various stemming materials and points out their advantages and disadvantages. It is the sixth in a series of reports on stemming tests conducted at Mt. Weather to promote more efficient use of explosives in metal mines.

In addition to sand, the following other materials were used in the stemming tests: Clay, mineral wool, vermiculite, limestone screenings, commercial hydrated lime, noncombustible blasting plugs, pulverized limestone, and used cardoxide, a chemical material employed as a carbon-dioxide absorbent in respiratory apparatus. Charges also were fired without stemming and with primers in cardboard tubes.

Two Cement Makers Will Erect Plants to Produce Alumina

At least two cement producers are about to embark on the production of alumina, according to advices from Washington.

The Volunteer Portland Cement Company is reported to be concluding arrangements with the government for the construction and operation of a new plant in the vicinity of Harleyville, South Carolina, where a site has been selected, for the production of alumina (aluminum oxide). The plant will comprise several large buildings for processing and production, with storage and distributing structures, laboratory for control and research, power house, machine shop and auxiliary units, including administration building. The plant will operate under a special process, utilizing clay and lime as basic raw materials, the latter obtained from limestone properties of the Volunteer company in Dorchester and Orangebury Counties, South Carolina. Machinery and equipment will be installed for a rated capacity of about 40 tons per day, with output to be shipped to certain aluminum plants in the South.

The new plant is estimated to cost about $2,650,000 with financing to be provided by Defense Plant Corporation. It is reported that the American Nepheline Corporation, Rochester, New York, producer of nepheline syenite, is interested in the project and that a joint company will be organized by that concern and Volunteer Company to operate the new plant.

The Monolith Portland Midwest Company, Laramie, Wyoming, is said to be closing arrangements with the government for the construction and operation of a plant for the production of alumina, using native raw material. The complete project is reported to cost about $4,000,000 with financing to be provided by Defense Plant Corporation. It is said that the War Production Board has recommended the project for immediate construction.

Nebraska Plant Making Stone for War Industry

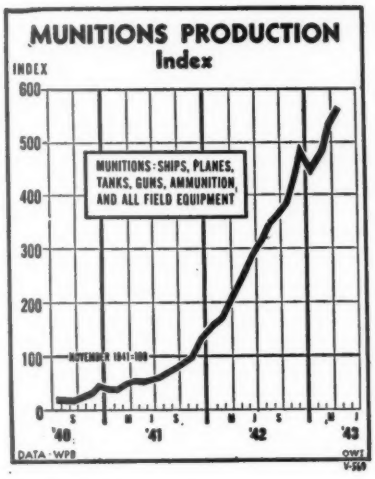
New equipment has arrived at the Davis crushed-stone plant, east of Wymore, Nebraska, for the B. L. Anderson Contracting Company, which is furnishing crushed rock for a defense project in Nebraska.

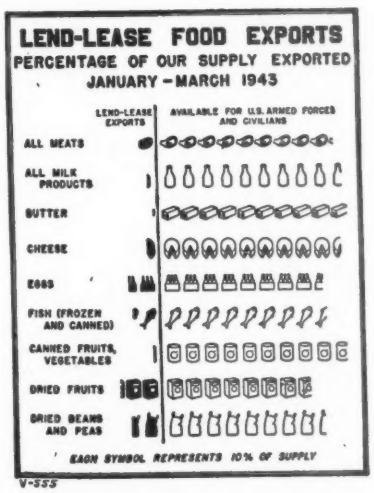
WASHINGTON NEWS LETTER

another P AND Q exclusive

FROM a production point of view we started to prepare for this war a year and a half before we were in it. The national defense program began about the middle of 1940 with the President's appointment of the Advisory Commission to the Council of National Defense. In the half-year that followed, we spent in preparing for war about $3,000,000,000. In early 1941 the Office of Production Management, headed by William S. Knudsen, took over the direction of the defense effort, and in that year war expenditures increased to $16,500,000,000. By January 1942 our inevitable involvement in the war had become a month-old reality, and in recognition of widespread public clamor for a strong centralized authority over the tremendous production energies of the nation, the War Production Board was established under Donald M. Nelson. In the year that followed war outlays reached the impressive sum of about $60,000,000,000. (These figures are all in terms of constant standard prices and are therefore on a comparable basis.)

In a recent report to the President, only parts of which have been released to the public, Mr. Nelson reviewed the progress in war production made in 1942 and summarized the prospects for 1943. Important lessons for future production policy are to be derived from last year's experience, and it is to be hoped that these lessons have been learned well, for the 1943 war program is valued at $106,000,000,000, 80 per cent. above 1942. In terms of munitions production alone the goals for 1943 are $72,000,000,000 about two and one-fourth times the output attained in 1942. Furthermore, in specific categories of munitions output the required rise this year is even greater—thus, the programmed value of bomber and fighter-plane production is 3.5 times the actual output in 1942. From any point of view the program for the current year is of staggering proportions.

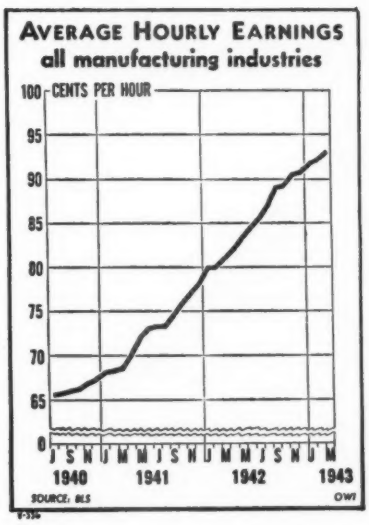




High as 1942 war production was, it failed to meet the schedules which had been established for most of the munitions programs. The reasons for this failure, now offered by the WPB for the first time, were the impossibly high level of the over-all program as initially developed, the slowness with which some objectives were revised downward, the generally chaotic manner in which the programs were translated into specific assignments to the industrial system, and the failure to institute tight and well-coördinated controls over the resources of the nation.

The present program for 1943 was designed with special attention to the limits of the supply of men and materials, and machinery has been established for the periodic review of objectives in relation to resources. These weaknesses of 1942 have therefore been virtually eliminated, but the basic problem of establishing and maintaining really effective production control still remains—the Controlled Materials Plan and production scheduling procedures serving as partial rather than complete answers. The WPB fully recognizes this deficiency and has signified its intention to tighten up all along the line during the remaining months of the year. In all fairness it should be pointed out that the military agencies still retain considerable authority over their respective production programs, and the fight against centralized control of their activities by the WLB is still being carried on, despite the armed truce which has existed for several months. The recent appointment of a new super-agency, the Office of War Mobilization, headed by James F. Byrnes, should have a wholesome effect in this sphere. The primary purpose of the new organization, in fact, is to resolve just such interagency disputes.

In terms of the impact upon the civilian economy, the rising level of war production will make increasing inroads into the supply of goods and services available to consumers. Heavy inventories of many consumers durable items concealed the fact of declining output in 1942, but most of these stocks are now gone, and curtailed output will increasingly be reflected in empty retailers' shelves. It is likely that by the final quarter of this year, consumers goods will be some 20 per cent. below the supply available in the same period last year. Similarly, mounting labor shortages will cut deeply into the volume of services available. The total effect of more stringent controls on the civilian economy in 1943 are summed up in the WPB report as: (1) elimination of civilian manufacturing and as much wholesaling as possible from critical labor-shortages areas; (2) increases in productivity of retail trades and service industries, especially in localities where labor is short; (3) curtailment of less essential goods and services, and simplification and standardization of more essential items. In all fields, however, the minimum or bedrock requirements of the civilian are to be protected.



AGRICULTURAL LIMING MATERIAL PRICES.—Sellers of agricultural liming materials on May 11 were granted alternative methods of establishing maximum prices for sales to farmer consumers and to the Agricultural Adjustment Agency, which is the largest United States buyer of these products. The alternatives set up by the Office of Price Administration enable sellers to recover a reasonable margin of return above current costs of production and distribution.

The new pricing methods are calculated in conformance with the President's recent "hold-the-line" order directing the Price Administrator not to allow increases in the cost of living.

Agricultural liming materials are vitally important to the farmer as soil conditioners, being used primarily to counteract soil acidity which interferes with production of crops.

Maximum Price Regulation No. 386 (Agricultural Liming Materials), effective May 15, 1943, establishes f. o. b. plant prices for liming materials in bulk under a variety of optional pricing methods. These are:

1. The highest prices charged to each class of purchasers for the same or similar grade and kind of agricultural liming material during March or April, 1942.

2. The price at which a bid was submitted to, and an award was made by the Agricultural Adjustment Agency in accordance with Amendment No. 9 to Revised Supplementary Regulation No. 4, which established the method by which producers contracting with AAA adjusted their maximum prices at figures that will cover production costs and at the same ttime, provide a reasonable margin of return. However, when this ceiling is used, in cases where a producer customarily has had different prices for different classes of purchasers, such price differentials are to be maintained by adding or deducting the customary dollars-and-cent differential to or from the price quoted to AAA.

3. If the producer prefers, he may add to his base period (1941) price the difference between his production cost during that base period and his production cost for the period from November 1, 1942, to April 30, 1943.

The regulation also provides that when sellers of agricultural liming materials are required by contract with an agency of the United States Government, or any other buyer, to deliver the materials to the farmer-consumer's premises or to deliver and spread it on his land, the seller may add to the f. o. b. plant price his cost of transportation and of spreading, including the three per cent federal transportation tax. This delivered or delivered and spread price may be handled as a flat or averaged price for a whole county or township.

When liming materials are sold in bags, 25 cents per ton, plus the cost of the bags, may be added to the bulk price.

Sales of agricultural liming materials by retail dealers to consumers customarily have been made on the basis of a small mark-up over cost. The dealer now is allowed to maintain this former mark-up by adding his increased material costs to his price ceilings.

Truckers performing a retail dealer's service may also charge their former mark-ups in addition to the transportation and spreading costs allowed for farmyard delivery. Higher production, transportation and spreading costs, unavoidable by either producers or dealers, made today's regulation necessary, OPA says. During the last several years it has been the practice for AAA to purchase a large proportion of its total requirements on the basis of a flat delivered price in an entire county or township Consequently, a predominant part of the industry was frozen bv the General Maximum Price Regulation on a delivered-price basis. These sellers were required to absorb increases in production and transportation costs, including the three per cent transportation tax imposed on December 1, 1942, by the Revenue Act of that year. The condition of the liming materials industry is such that being forced to absorb even as little as 5 or 6 cents per ton would seriously curtail production.

The application of liming materials to farm soil is particularly essential at this time when the nation is engaged in the production of huge quantities of food and feed products. Many kinds of farm soil are so strongly acid and deficient in calcium and magnesium that ordinary fertilizers used upon them may be totally wasted unless the ground is first well limed.

Cost of farm produce to the consumer will not be increased by the slightly increased ceiling prices granted today to liming materials producers, said OPA. An increase of as much as 30 cents per ton for agricultural lime would increase parity only twelve-thousandths of one per cent, while the continued or increased liming of farm soil will increase crop production per acre both as to quantity and quality, thus reducing the farmer's cost of production.

Once well limed, at the average of about a ton per acre, farm soil stays effectively limed for four or five years. This is because agricultural liming materials do not dissolve and wash through the earth as rapidly as do many fertilizer materials.

The text of the order follows:

(Document No. 15430)

PART 1367—FERTILIZERS

[MPR 386]

AGRICULTURAL LIMING MATERIALS

In the judgment of the Price Administration, it is necessary and proper to establish the maximum prices of agricultural liming material, when marketed or sold as an aid to the growth of crops and plants, as those prices differ from those heretofore established under the General Maximum Price Regulation.[1]

So far as practicable, the Price Administrator has ascertained and given due consideration to the prices of agricultural liming materials prevailing between October 1 and 15, 1941, and has made adjustments for such relevant facts as he has determined and deemed to be of general applicability; and he has advised and consulted with representative members of the industry which will be affected by this regulation.

In the judgment of the Price Administrator, the maximum prices established for this regulation are and will be generally fair and equitable, and will effectuate the purposes of the Emergency Price Control Act of 1942, as amended.

A statement of the considerations involved in the issuance of this amendment has been issued simultaneously herewith and filed with the Division of the Federal Register.*

[1] 8 F.R. 3096, 3849, 4347, 4486, 4724, 4978, 4848.

§ 1367.151. *Maximum prices for agricultural liming materials.* Under the authority vested in the Price Administrator by the Emergency Price Control Act of 1942, as amended, Executive Order 9250 and Executive Order 9328, Maximum Price Regulation No. 386 (Agricultural Liming Materials), which is annexed hereto and made a part hereof, is hereby issued.

AUTHORITY: § 1367.151 issued under Pub. Laws 421 and 729, 77th Cong.; E.O. 9250, 7 F.R. 7871; E.O. 9328, 8 F.R. 4681.

MAXIMUM PRICE REGULATION 386—AGRICULTURAL LIMING MATERIALS

ARTICLE I—PROHIBITION AND SCOPE OF REGULATION

Sec.
1 Prohibition against dealing in agricultural liming materials at prices above the maximum.
2 Less than maximum prices.
3 To what transactions, materials and persons this regulation applies and its relation to other regulations.

ARTICLE II—MAXIMUM PRICES

4 Sales by producers.
5 Sales by truckers.
6 Sales by retail dealers.
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9 Reporting new prices.
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Article I—Prohibition and Scope of Regulation

SECTION 1. *Prohibition against dealing in agricultural liming materials at prices above the maximum.* On and after May 15, 1943, regardless of any contract (except contracts heretofore entered into with the Agricultural Adjustment Agency of the Department of Agriculture), agreement, lease or other obligation, no person shall sell or deliver, and no person, in the course of trade or business, shall buy or receive, agricultural liming materials, at prices higher than the maximum prices established herein, and no person shall agree, offer, solicit or attempt, to make such a sale, purchase or delivery.

SEC. 2. *Less than maximum prices.* Prices lower than the maximum prices established in and pursuant to this regulation may be charged and paid.

SEC. 3. *To what transactions, materials and persons this regulation applies, and its relation to other regulations*—(a) *Transactions and materials.* This regulation applies to all sales of agricultural liming materials, that is, all of the various kinds and grades of materials containing calcium or calcium and magnesium compounds when sold for use as soil amendments or conditioners including, but not limited to, ground and pulverized limestone, limestone screenings and meal, burnt lime, hydrated lime, air-slaked lime, ground and burnt mollusk shells, calcareous and dolomitic fertilizer fillers, marl, slag and by-product liming materials such as sugar house lime and acetylene lime waste.

(b) *Persons involved.* This regulation applies to producers, truckers and retail dealers who sell agricultural liming materials, and to farmers, truckers, retail dealers, cooperative farm associations, and departments and agencies of the United States Government who buy agricultural liming materials.

(c) *Scope of this regulation and its relation to other regulations*—(1) *Geographical scope.* This regulation applies only in the forty-eight states of the United States and in the District of Columbia and does not apply to Puerto Rico and other territories and possessions of the United States.

(2) *Contractual scope.* The provisions of this regulation apply to all sales and contracts of sale for agricultural liming materials, except contracts of sale entered into with, or awards made by, the Agricutural Adjustment Agency of the Department of Agriculture before the effective date of this regulation.

(3) *Relation to the General Maximum Price Regulation.* The provisions of this regulation supersede the provisions of the General Maximum Price Regulation with respect to sales and deliveries for which maximum prices are established by this regulation. The following sections of the General Maximum Price Regulation and amendments to them, shall apply to sellers of agricultural liming materials:

(i) Transfers of business or stock in trade (§ 1499.5).

(ii) Sales for export (§ 1499.6).

*Copies may be obtained from the Office of Price Administration.

(iii) Federal and state taxes (§ 1499.7).
(iv) Current records (§ 1499.12).
(v) Registration (§ 1499.15).
(vi) Licensing (§ 1499.16.).
(vii) Penalties (§1499.17).
(viii) Adjustment of maximum prices (§ 1499.18).

(4) *Relation to Revised Procedural Regulation No.* 1. An application for an adjustment, a petition for an amendment, or a protest shall be filed with the Office of Price Administration in the manner provided under Revised Procedural Regulation No. 1.[2]

Article II—Maximum Prices

SEC. 4 *Sales by producers*—(a) *Bulk sales f. o. b. plant.* The maximum price which a producer may charge on bulk sales of agricultural liming materials f. o. b. plant (loaded on railroad freight car, truck, barge, boat or other conveyance at the point of production) is the highest price calculated according to Rule 1, Rule 2, or Rule 3, as the producer chooses. For sales in bags, Rule 4 shall be used. For sales at stockpile or railroad siding, Rule 5 shall be used. For sales on delivered, or delivered and spread basis, Rule 6 shall be used.

Rule 1: *Maximum prices based on March or April* 1942 *ceilings.* The maximum price calculated according to this rule shall be the highest f. o. b. plant price the producer charged each class of purchaser for the same or similar kind and grade during March or April, 1942 (if a producer had no f. o. b. plant price see (b) below).

Rule 2: *Maximum prices based on AAA awards.* The maximum price calculated according to this rule shall be the f. o. b. plant price at which an award was made to the producer by the Agricultural Adjustment Agency between September 12, 1942, and May 15, 1943 (if a producer has no f. o. b. plant price see (b) below), except that, if sales to farmers, dealers or truckers were customarily made at higher or lower prices than such AAA award price, the higher price may be maintained or the lower price shall be maintained as the case may be, by adding to or deducting from such award price the customary dollar-and-cent differential.

Rule 3: *Maximum prices based on* 1941 *average prices.* Instead of following Rule 1 or 2, the producer may calculate a new f. o. b. plant price by subtracting his average production cost per ton during the calendar or his fiscal year ending in 1941, from his average present production cost per ton, and adding the difference to his average 1941 price for each class of purchaser and kind and grade of material.

The producer's average 1941 production cost per ton is arrived at by adding all of the applicable items of his 1941 costs of all of his materials of the same kind and dividing the addition by the total number of tons of all such materials produced at his plant during 1941.

The producer's average present production cost per ton is arrived at by adding all of the applicable items of his costs between November 1, 1942 and April 30, 1943, and dividing the sum by the total number of tons of all such materials produced at his plant during that period. The applicable items of production costs used in arriving at both averages shall correspond, and may include labor, raw materials, power, heat, maintenance, repair and depreciation of equipment, rentals, insurance, and taxes, except income and excess profits taxes.

A producer, who produces different kinds of agricultural liming materials, shall calculate the average production cost of each kind of material separately. For example, burnt lime and hydrated lime are of one kind and shall enter into the same calculation of the average production cost for that kind. On the other hand, crushed limestone, limestone sand, fluxing stone, and various grades of agricultural limestone are materials of another kind and shall enter into a separate calculation of average production cost for such kind.

Such new maximum f. o. b. plant price so calculated shall not exceed the average price for each class of purchaser and kind and grade of material for the calendar or fiscal year 1941, by more than 30 cents per ton on agricultural liming materials sold for not more than $2.00 per ton during such period, or by more than 15 per cent on agricultural liming materials sold for more than $2.00 per ton.

Rule 4: *Maximum prices for sales in bags.* For sales f. o. b. producer's plant of agricultural liming materials in bags, the producer shall calculate his maximum price by adding to the f. o. b. plant price as determined under Rule 1, 2 or 3 above, 25 cents per ton plus the cost of the bags.

Rule 5: *Maximum prices for sales at stockpiles or railroad sidings.* Where the producer establishes a stockpile at a place other than in the vicinity of his plant, or ships from a railroad siding not in the vicinity of his plant, he may add to the maximum price as determined under the foregoing rules an amount equal to the actual cost to him of handling and transporting the material from his plant to the stockpile or railroad siding.

[2] 7 F.R. 8961; 8 F.R. 3313, 3533.

Rule 6: *Maximum prices for a delivered or delivered and spread sale.* The producer's maximum price under this rule shall be his applicable f. o. b. plant, stockpile or railroad siding price as established under the foregoing rules, plus an amount equal to his handling and delivery cost, plus his cost of spreading, if any. (For flat delivered price, see section 8 below.)

(b) *Calculation of an f. o. b. plant price from a delivered price.* Where the producer had no f. o. b. plant price to which to apply Rule 1, 2 or 3 above, his f. o. b. plant price shall be calculated by deducting from his delivered, or delivered and spread, price an amount equal to his average cost of delivery, or delivery and spreading, of the agricultural liming materials, during the applicable period; where the producer's delivered, or delivered and spread, prices varied among delivery areas, he shall calculate his f. o. b. plant price by deducting from such delivered price in the county or political subdivision in which his plant is located, or nearest thereto, an amount equal to his average cost of delivery, or delivery and spreading, of the material, during the applicable period.

SEC. 5. *Sales by truckers.* A trucker, or one who purchases agricultural liming materials for resale and delivery by truck to the consumer's premises, shall calculate his maximum price by adding to his net cost at producer's plant, stockpile or railroad siding an amount equal to the trucker's cost of handling and delivery to the consumer's premises, plus spreading cost, if any, plus the dollars-and-cents customary or average markup over his cost, which he charged in 1941. (For flat delivery price, see section 8 below.)

SEC. 6. *Sales by retail dealers.* A retail dealer shall calculate his maximum price by adding to his cost of materials at the producer's plant, stockpile or railroad siding, or his own warehouse or place of business, as the case may be, his actual expenditure, if any, for transportation to his warehouse or place of business, plus an amount equal to the dealer's cost of handling and delivery, to the consumer's premises, plus spreading cost, if any, plus the dollars-and-cents customary or average markup over his cost, which he charged in 1941. (For flat delivered price, see section 8 below.)

SEC. 7. *Sales by new sellers.* Where a person becomes a seller of agricultural liming materials after the effective date of this regulation, his maximum price to each class of purchaser is the maximum price for the same or similar kind or grade of agricultural liming materials of his most closely competitive seller of the same class. (For flat delivered price, see section 8 below.)

SEC. 8. *Sales at flat prices.* Any seller of agricultural liming materials may charge for deliveries within any single county or political subdivision thereof, one maximum flat delivered, or delivered and spread, price. Such maximum flat price for a producer shall be calculated under Rule 6 above. Such maximum flat price for a trucker shall be calculated under section 5 above. Such maximum flat price for a retail dealer shall be calculated under section 6 above. Such maximum flat price for a new seller shall be established under section 7 above. However, in calculating his maximum flat price, the seller, in applying the rule or section applicable to him, shall include therein his handling and delivery cost, and his costs of spreading, if any, referred to in such rule or section, by listing all, or a representative group of, his prospective deliveries, or delivered and spread sales, in the particular county or political subdivision thereof, and averaging his actual or estimated costs of such handling and delivery, or costs of delivering and spreading, as the case may be, in such county or political subdivision thereof.

Article III—Miscellaneous

SEC. 9. *Reporting new prices.* Every producer, who follows Rule 3 in calculating a maximum price, shall submit to the Office of Price Administration, Washington, D. C., in writing, his calculations, showing in detail, how he determined his average production cost per ton during the calendar or fiscal year 1941, the average present production cost per ton, the average price or prices during the calendar or fiscal year 1941, and the new price or prices for each kind and grade of agricultural liming materials to each class of purchaser. Every person who becomes a new producer, after the effective date of this regulation, shall report to the Office of Price Administration, Washington, D. C., his maximum, or less than maximum prices, determined as provided in section 7 above.

SEC. 10. *Imports.* The provisions of this regulation do not apply to the purchases, sales or deliveries of the commodities named in this regulation if they originate outside of and are not imported into continental United States. Sales, purchases and deliveries of such imported commodities are governed by the provisions of the General Maximum Price Regulation, and especially Revised Supplementary Regulation No. 12.

This regulation shall become effective this 15th day of May 1943.

NOTE: The record-keeping and reporting provisions of this regulation have been approved by the Bureau of the Budget in accordance with The Federal Reports Act of 1942.

Issued this 10th day of May, 1943.

PRENTISS M. BROWN,
Administrator.

CEMENT - PRICING PROVISION AMENDED.—The use of an alternative method for pricing cement sold by manufacturers to war procurement agencies was extended on June 15 by the Office of Price Administration from June 30 to December 31, 1943.

The particular pricing provision (PIT AND QUARRY, December, 1942, page 30, *Cement Prices Outside Selling Area*) was established as an emergency measure to provide an expedient method for pricing cement sold by manufacturers and shipped from one deficiency area into another. Although cement requirements have diminished, an emergency still exists in several areas of the country which requires continuation of the alternative method.

The provision states that a price f. o. b. mill may be charged to points inside or outside the producer's normal market area if it is not in excess of the highest price realized by the manufacturer at the mill on a comparable sale to a similar purchaser during the period March 1-15, 1942.

The extension is contained in Amendment No. 3 to Maximum Price Regulation 224 (Cement), which became effective June 21, 1943.

CLAY-PRODUCTS-PLANT CONVERSION.—Clay-products plants, now running at only 35 per cent. capacity due to the curtailment of building programs, can readily be converted to charcoal production and can thus lessen the present critical shortage of this essential war material, the War Production Board revealed on June 3.

Peace-time demand for charcoal was about 405,000 tons annually, and the producing capacity exceeded this figure by about 70,000 tons. At present, however, direct and indirect military requirements alone are set at approximately 400,000 tons per year. It is estimated that June production will be sufficient for only 80 per cent. of the total military and essential industrial requirements, without taking into consideration normal civilian consumption for which no charcoal is available.

In addition to its military uses, charcoal is needed for producing copper, brass, bronze, nickel, high-carbon ferro chromium, ferro silicon, glass, and in chemical and other industrial processes. It is also used in poultry and stock feed, for curing meat and tobacco, and for heating railroad cars transporting fruits, vegetables and other perishables.

An appeal is being made by the WPB to operators of clay-products kiln situated in wooded areas to convert to charcoal production. Conversion is not advocated elsewhere since this would necessitate transporting wood to the kilns. The process of converting a clay-product kiln is relatively simple and can be carried out for approximately $150 per kiln. Cordwood and the by-products of lumber operations—slabs and waste wood down to a diameter of approximately 1½ inches can be utilized in the kilns. Both soft and hardwood species are suitable and, though dry wood gives better results, green can also be used.

Detailed instructions on the conversion of kilns and on charcoal making have been sent to clay-products plants in wooded areas by the WPB's Building Materials Division and arrangements are being made by the division for clay-products manufacturers to visit nearby charcoal plants and observe operations at

first hand. When converted, an average clay-products kiln (30 feet in diameter) can produce about 35 tons of charcoal per month.

CONSTRUCTION MACHINERY PARTS.—The certification "in a writing" required under Limitation Order L-192 before a purchaser can obtain construction-machinery repair parts to meet an actual or impending breakdown may be made in the form of a telegraphic certification, M. B. Garber, Acting Director of WPB's Construction Machinery Division stated today. According to Mr. Garber, a telegram is "a writing" and is, therefore a proper certification for the purposes of L-192, provided it contains the information that the order requires to be set forth in such certification.

Mr. Garber pointed out, however, that if a telegraphic certification is made in such cases where the purchaser is using a preference rating assigned by CMP Regulations 5 or 5A or any preference rating order in the "P" or "U" series, that also require certification, the purchaser must further note on his telegraphic certification the source of his rating and add the statement "ratings certified."

The purchaser also must keep a copy of the telegraphic certification in his records signed by him as provided in Priorities Regulation No. 3.

CONSTRUCTION-MACHINERY SALES.—Prohibition of the sale of certain types of construction machinery and equipment in inventories was removed by the War Production Board June 1 in an amended issue of Limitation Order L-192.

The original order (published as amended April 9, 1943, in *P. & Q.*, December, 1942, pages 30-32) prohibited acceptance after June 1, 1942, of purchase orders for certain types of graders, levellers, scrapers and other items listed in Schedule D attached. The newly amended order eliminates the time limitation so far as it affects such items in inventories.

The amended L-192 also adds a definition of "dealer or distributor" to make it clear that references in the order to dealers and distributors apply only to those located in the forty-eight states and the District of Columbia.

GASOLINE IN EASTERN STATES.—A complete revision, on the basis of the degree of essentiality, has been made in the list of industries to be accorded preferential treatment in the Eastern gasoline shortage area, the Office of Defense Transportation announced June 7. The revised industry list (ODT-283) was certified to the ODT by the War Production Board. It replaces the original WPB list announced May 30 (ODT-275).

Essential industries on the original list are recast, with some additions, into four groups: AA-1 (Most Critical); A-1 (Very Critical); A-2 (Critical); and A-3 (Important). As long as the supply of gasoline in the East remains critical, lesser amounts may be allocated to the lower-rated industries than to the higher.

In announcing the revised list, the ODT again emphasized that even those carriers whose services are listed as essential will not be granted additional gasoline unless they are utilizing their trucks to the fullest extent possible.

When determining whether a carrier is fully utilizing his equipment, consideration will be given to the use made of Joint Information Offices and participation in joint action plans, as well as other conservation devices which can be employed in an effort to eliminate, so far as is practicable, empty or partially loaded vehicle mileage.

Any truck operator who does not qualify for additional gasoline, and has not yet begun to cut his consumption by at least 40 per cent. risks a breakdown in his operations during the last portion of current quarter, the ODT warned.

The present commercial-vehicle ration period has been extended by 25 days and operators should now be "stretching out" their gasoline allotment through reduced operations to insure being able to operate during the additional period.

All the industries included in this preferential list are considered vital to the war effort by the ODT and trucks serving them should be supplied with gasoline for necessary truck transportation. The preferred industries are divided into four categories which are: AA-1, A-1, A-2 and A-3, in accordance with the degree of essentiality for the war effort and prime civilian requirements. It is intended that trucks serving all the industries included in the four categories shall receive, where necessary, gasoline rations in addition to the reduced gasoline allowances, for truck operations necessary to the performance of the basic functions of the industries. There is no distinction between industries within any numerical priority classes. Where the supply of gasoline in the area is inadequate for all the needs of all the industries included, lesser amounts may be given to the lower-rated industries, but it is not intended that truck service be substantially withdrawn from any of these essential industries.

Schedule A includes, among many other industries the following which cover the nonmetallic minerals industries generally:

Classification	Industry or Activity	Degree of Essentiality
4.08	Motor trucks, Off-the-Highway Vehicles and Truck Trailers	A-2 (Critical)
12.21	Mining, Milling, Smelting and refining of Nonmetallics	A-1 (Very critical)

GRAPHITE IN WAR.—Supplementing a study of flake graphite, listed as one of the "critical" raw materials essential to the war program, the Bureau of Mines has issued a report on the oxidation or burning rate of this mineral whose products often are subjected to high temperatures in their use. A form of carbon, graphite has many war uses. It is employed as a lubricant, as a foundry facing, and in manufacture of crucibles, core washer, stoppers for steel ladles, paints, and electrical equipment.

The need for information on its burning rate became apparent during a survey of domestic graphites which was undertaken before the United States entered the war to find suitable substitutes for large flake graphites imported from Madagascar and Ceylon. Among graphites considered were those of Alabama and Pennsylvania which had been exploited during the last war. Suitable means were developed for milling the graphite-bearing rock to produce the larger size flake now needed, and the War Production Board, guided by these results, made arrangements for building two mills in Alabama, one in Pennsylvania, and helped finance one in Texas.

The usual specifications, however, such as those pertaining to size of flake and purity, were found insufficient to determine the suitability of different graphites for different uses. The current report, therefore, describes a method for determining the burning rate, using arithmetical derivative of the graphite oxidation curve, and discusses in detail the laboratory technique employed in establishing the oxidation curve.

The oxidation rates of Madagascar, Ceylon, and four domestic flake graphites were determined, and the author concludes that the burning rate of any definite graphite increases directly with decrease in sieve size, that the gangue minerals present in each of the six concentrates tested greatly retarded the burning rate of the graphite, and that the domestic graphites had about the same burning rate, for equivalent sieve sizes, as the Madagascar flake and a much lower rate than Ceylon's crystalline graphite. The slowest burning graphite lasts longest.

Further information may be obtained by writing to the Bureau of Mines, Department of the Interior, Washington, D. C., for Report of Investigation 3692, *The Burning Rate of Natural Graphite*, by Glen Dale Coe.

TRACTORS AVAILABLE—Certain models and types of track-laying tractors may be produced as a result of an amended L-53-a issued June 10 by the War Production Board. Such tractors, however, can only be produced on specific authorizations of the War Production Board in writing, and such authorization can only be extended for the production of models of track-laying tractors designated in the original order, or models of substantially the same specifications and weight.

The tractors affected are the following: Allis-Chalmers Model M, Caterpillar Models D-2 and R-2, Cleveland (Cletrac) Models A and H, International Models TD-6 and T-6.

TRUCK ALLOTMENT SIMPLIFIED.—The procedure required to allot production of medium and heavy trucks and off-the-highway motor vehicles was simplified by the War Production Board on May 28 in issuing an amended Limitation Order L-1-e. The amended order empowers the War Production Board to issue from time to time letters of authority which will specifically authorize manufacturers to produce a given number of automotive vehicles of the types specified within given periods of time.

Before L-1-e was amended it was necessary each time an allotment was made for the production of the vehicles to issue an amendment to the order. The present order is an enabling act which will permit the allotment to be made on authorizations without going through the lengthier procedure involved in amending the order.

The amended order further provides that producers of medium or heavy trucks or off-the-highway vehicles may, notwithstanding the provisions of Priorities Regulation No. 1, schedule their production of such vehicles as if the purchase orders for them bore a rating of AA-2X.

TRUCK PARTS AND SUPPLIES RECEIPTS.—Commercial-motor-vehicle operators were relieved June 10 from the provisions of the Office of Defense Transportation's General Order 21 which required them to sign receipts for gasoline, parts, tires or tubes and to endorse the receipts with

their Certificate of War Necessity number. Commercial motor vehicles include trucks, buses and taxicabs.

The ODT's action was taken in an amendment to Order 21 which revised section 501.96 by eliminating paragraph (b) and consolidating paragraphs (a) and (c) into one paragraph.

USED AUTOMOTIVE PARTS.—Scrapping of serviceable used automotive parts was stopped May 20 by the War Production Board with the issuance of Conservation Order M-311. The new order provides that on and after June 1, 1943, irrespective of the terms of any contract or agreement, no person shall scrap, sell or deliver as scrap any used automotive part listed in Schedule A attached to the order, except when such part is "no longer serviceable."

This prohibition does not apply:

(1) To used automotive parts prepared for shipment or in transit to steel mills, foundries, or furnaces on June 1, 1943; (2) to used automotive parts which on June 1, 1943, are mingled with other forms of scrap to an extent where segregation is impracticable; (3) to the sale or delivery of vehicles or chassis to auto wreckers, scrap dealers, automotive dealers, repair shops and garages or between individuals, or to the sale and delivery of used automotive parts other than as scrap.

The order in no way prevents individuals from selling vehicles to automobile wreckers; but it will encourage wreckers to retain serviceable parts for resale instead of passing them along to steel mills and furnaces in the form of scrap.

The prohibition against scrapping used parts covers not only automobile wreckers and scrap dealers but all persons in the business of buying or processing used automotive parts for re-sale whether re-built or "as is."

M-311 also provides that no person shall sell or deliver any used automotive part to a consumer unless the consumer delivers to such person a used automotive part of similar type and size, except where the part for which the consumer requires a replacement has been stolen or destroyed. This restriction does not apply in the case of Governmental agencies, prohibited by law from disposing of used automotive parts.

Recognizing that there may be circumstances justifying the scrapping of serviceable parts, the order provides that applications for authority to scrap serviceable used parts or complete vehicles may be filed with the field office of the War Production Board for the district in which the applicants' place of business is located.

Schedule A follows:

SCHEDULE A

The used automotive parts to which this order applies are listed below, and include such parts for all motor vehicles regardless of make, model or year. This schedule may be amended from time to time by the addition or removal of certain parts, or by specifying parts for certain makes, years or models of vehicles, or otherwise.

Axles:
- Axle shaft.
- Front axle assembly.
- Propeller shaft.
- Ring and pinion gear.
- Shock absorber
- Two-speed axle assembly.
- Universal joint.

Bearings:
- Ball bearing.
- Roller bearing.
- Taper bearing.

Brake:
- Brake drum.
- Brake shoe.

Clutch:
- Clutch assembly.
- Clutch disk.
- Clutch pressure plate.

Cooling system:
- Radiator.
- Radiator core.
- Water pump.
- Fan belt.

Engine:
- Engine assembly.
- Engine block.
- Cylinder head.
- Cylinder sleeve (wet).
- Connecting rod.
- Piston.
- Piston pin.
- Valve.

Fuel system:
- Fuel pump.
- Carburetor.

Ignition system:
- Coil.
- Distributor.
- Spark plug.

Spring:
- Helper spring.
- Spring front.
- Spring rear.

Starting and generator equipment:
- Battery cable.
- Cut-out.
- Generator.
- Generator armature.
- Starter motor.
- Starter (Bendix).
- Starter armature.
- Voltage regulator.

Steering:
- Steering assembly.
- Steering arm.

Transmission:
- Transmission assembly.
- Transmission gear.
- Transmission shaft.

Miscellaneous:
- Window regulator.
- Windshield wiper motor.

Special truck equipment:
- Air brake.
- Auxiliary transmission.
- Booster brake.
- Dead axle.
- Fifth wheel and mounting.
- Hydraulic hoist.
- Pole setter.
- Power take-off.
- Power winch.
- Refrigerator unit.
- Reserve gasoline tank.
- Vacuum tank.

USED CONSTRUCTION MACHINERY.—More than 7,000 items of used construction machinery with an estimated value of $60,000,000 have been supplied for construction jobs during the past six months through the inventories of used construction equipment set up in the War Production Board's twelve regional offices, according to the Construction Machinery Division. The utilization of this machinery has saved a corresponding amount of new equipment representing some 120,000 tons of raw materials.

The inventories in the regional offices contain approximately 500,000 items, division officials said. Registration of used construction machinery was begun in the fall of 1942 with the issuance of Limitation Order L-196, which requires that new construction machinery be registered in the nearest regional office within 30 days of its acquisition (Form WPB 1159). The over-all inventory is estimated to be 75 per cent. complete with more registrations coming in continuously. Sales, rentals, and changes in service status—that is, uses on projects other than those for which the machinery was originally bought—are also reported to the regional offices (on Form WPB 1333), and this procedure keeps the inventories up to date.

Construction-machinery specialists attached to the twelve WPB regional offices and to ten district offices are charged with giving assistance to contractors, mines, industrial plants, etc., in locating idle used equipment and facilitating transactions for its sale and rental. Because of their close contact with local conditions they know when specific projects are nearing completion and when equipment will be available for other work. In this way they are able to extend and supplement the data secured through required registration.

Applications for the purchase of certain types of new construction machinery which must be approved in the regional offices (Limitation Order L-192, Schedules A and C), are checked against the inventories of available used equipment. If suitable used machinery is on hand negotiations are started for its acquisition in place of new machinery, and in general the needed equipment can be supplied more quickly by resale or rental than by approval of applications for new equipment.

Slag Output Higher in 1942; Industry Grows

The total output of air-cooled screened and unscreened, and water granulated slag for 1942 was 19,122,718 short tons as compared to 14,678,266 tons for 1941. Sales of air-cooled slag were 19 per cent. greater in 1942 than in 1941, and the average value per ton was one cent lower. These figures are based on a canvass conducted by the National Slag Association of the 31 companies that prepare blast-furnace slag for commercial use. The results were assembled in coöperation with the Bureau of Mines.

Practically all of the commercial output is produced east of the Mississippi River, chiefly at steel centers located in Ohio, Alabama, Pennsylvania, and Illinois. Shipments, however, are made into all states east of the Mississippi except some of the New England states outside the economic range of sources of supply.

The average shipping range of blast furnace slag in 1942 was 52 miles by rail, 17 by truck, and 117 by waterway. In most instances shipments did not exceed 140 miles by railroad, 35 by truck, and 160 by waterway.

During the process of crushing and screening blast furnace slag, particles of metallic iron which escape through the slag notch of the blast furnace are recovered at the slag plant by means of handpicking and magnetic pulleys. During 1942 the companies surveyed reported 165,679 tons of metallic iron recovered and returned to the furnaces to bolster the supply of metal so vitally needed in the prosecution of the war. The yield is slightly in excess of 1.2 per cent. or approximately 24 pounds of metallic iron per short ton of slag processed.

Not including those assigned to administrative, office, and sales activities, 1,629 plant and yard employees were engaged in the production of commercial slag in 1942.

EDITORIAL

Is America Ready To Teach?

MANY people, when they stop to discuss the probable state of international relations after the war, voice the hope and, indeed, the firm conviction that America must educate the world, but more particularly the Axis nations, in the principles of democracy as we understand them. It is our duty, they say, unless we are content to remain an oasis of liberty in a desert of world fascism, not only to fight for our libertarian beliefs now but to make certain that they are made the moral standards of other nations, if the peoples of the world are to be freed from the burdens of recurring wars. What logic, they ask, can one find in our national willingness to adopt warfare as a means of throwing off the yoke of tyranny that has recently been threatening to destroy what remains of human liberty, if we are not also willing to assume the responsibility in time of peace of trying to educate those who, freely or under compulsion, have embraced the ideologies that have brought large sections of humanity to its present sorrow? When our entire national economy has been turned from the pursuits of peace to the destructiveness of war, all for the realization of a high ideal, why should we shirk the moral duty of exercising our mental powers, as we now exert our physical strength, to the utmost, without stint, and without calculating the cost?

Aside from the element of egotism that supplies much of the motivating force that lies behind such an ambition, there is a large share of unselfish interest in human welfare and a large share of rational thinking. If the principles of human liberty, as they have been made known and become operative in America, have won wide acceptance, not only here but elsewhere, what good reason is there to suppose that men everywhere, and particularly those who have long experienced the enslavement of their minds and bodies, will not be ready and eager to grasp the opportunity for physical and intellectual freedom which has shaped this country's development? And if we have earned for ourselves the great privileges which that opportunity has provided, may not we properly show to others what its fruits have been and point out how its gains may be acquired?

Fearful of any trend in American thought which might weaken our traditional determination to stand alone, those who oppose any attempt on our part to play a larger and less isolated role in human progress argue that Americans are not yet prepared as a nation to practice or even accept the tenets of democracy as they are commonly proclaimed by us, that our shortcomings in this respect disqualify us as would-be leaders in world thinking, as guides in the march toward the world-wide recognition of liberty and democracy as the ultimate goals in man's upward struggle. Since we are but very imperfect practitioners of the principles of democracy, since there are among us large segments of the population who openly proclaim but secretly disown those principles, since we do not appear to be ready to apply them when their application works a real or imagined hardship—since we are in these and numerous other ways not ourselves beyond criticism, why, ask these opponents, have we the right to take upon ourselves the duty of liberating the world, of pointing with righteous self-acclaim to our own imperfect accomplishments as examples of what can be attained if the world would but adopt our high moral code and push its acceptance with our high purpose and indefatigable energy? Against the hopeful aims of those who believe in the possibility of extending to all men the benefits that have come to those who live in democratic America are thus opposed the arguments of those who perhaps fear the spread of democratic ideals even in America and measure the likely benefits of world-wide democratization by the standards of what they conceive to be their long-run self-interest.

It is the duty of the teacher to teach to the limits of his knowledge; it is the duty of the preacher to preach to the limits of his belief; it is the duty of the leader to lead to the limits of his enthusiasm. It can not properly be argued against the determination of any one of these, or against his right to teach, to preach or to lead, that his knowledge is not universal, that his belief is not complete, that his enthusiasm is not unwavering. The best example, however short it may fall of being the perfect example, is still the best example—the example that men strive to emulate, the criterion by which they judge of their advance. America and Americans, however imperfect their realization of the ideals of democracy—and recent events have shown only too clearly how far we must still move forward—have shown the world the best example of democratic living, and that fact alone entitles them to attempt the peaceful democratization of those other parts of mankind which aspire not alone to follow that example but to go beyond it and to set new high standards for the encouragement of freedom-loving men.

AND while we offer ourselves freely as imperfect but nonetheless useful examples to the rest of the world of what can be achieved, let us not forget that ours, too, is a proving ground on which the principles of democracy are still undergoing experiment and that we, too, still have much to learn and much to demonstrate as evidence of our sincerity. Between now and the war's end let us resolve not to condemn as ignorant those from whom we have withheld education, not to treat as vicious those whom we consign to existence in slums, not to criticize as lazy those to whom equality of economic opportunity is not open, not to accuse of lack of Americanism those who have never enjoyed political equality. Let us in meekness and in consciousness of our own defects try to make the world more democratic, but let us also try to bring to Americans, too, a higher realization of the benefits of the kind of liberty and democracy which the authors of the Declaration of Independence envisioned and the drafters of our Constitution tried to guarantee for the citizens of America.

LEFT—Duplex all-steel washing and recovery plant. The five cone-bottom storage tanks hold 250 tons each.

By W. H. TAYLOR

Land-Pebble Phosphate Deposits of Florida—V

THE most important development in the mining methods of the Florida land-pebble phosphate deposits within recent years has been the growing use of hydraulic classification, flotation, electrostatic separation and similar selective concentration processes. These recover small particles of phosphate rock that formerly were wasted in the water discharged from ordinary washing and screening operations. Their use has recently increased the total recovery to about 90 per cent. and the total production 50 per cent. or more.

Hydraulic classification separates particles of phosphate rock from particles of sand and clay by taking advantage of differences between their settling rates in water and by controlling the settling conditions in the water used. The process comprises a series of operations in which relatively large particles are allowed to settle, while smaller particles are kept in suspension by currents in the fluid. The uppermost part of the fluid, in which the smallest solid particles are suspended, is overflowed constantly by running new material into the settling phosphate rock; in others they are a mixture of phosphate and waste particles. Some of the solids that overflow are extremely small particles of phosphate and waste that can not be separated, and are discarded in a process called desliming; others are a mixture of phosphate and waste particles that are partly separated when settling conditions are altered.

By adjusting settling conditions for each mixture of phosphate and waste particles obtained after desliming, all the phosphate particles that are substantially larger or heavier than the accompanying particles of waste are settled out and recovered. Smaller phosphate particles that fail to settle in the latter steps can not be separated by hydraulic classification, because their size and specific gravity are too nearly equal to those of the accompanying waste particles to attain the necessary relative difference between their settling rates. They are sent, therefore, to the next major recovery operation, where they are separated by flotation or similar processes.

In view of the fact that it is necessary to thoroughly deslime these fines and put them through a final classification before delivering them to the recovery plants for flotation, they are either run by gravity or pumped from the washing plants, along with all other fines which have been screened out of the material transported from the pits, into enormous hydroseparators. These machines are 40 feet in diameter with flat cone-shaped bottoms, in which circular rakes slowly pull the settled solids to the center, where they are received by pumps which elevate the material to storage bins at the recovery plants. These hydroseparators are equipped with circular lips about 38 feet in diameter and one foot lower than the outside walls of the tanks. The circular spaces between the outside and inside walls act as launders for carrying away the waste materials which overflow the entire circumference of the lips.

These machines settle out the plus-150-mesh material and throw the minus to waste along with the slimes. On account of the enormous amounts of slimes encountered in the muddy high-grade phosphate deposits, the efficiency of these machines has been very low, and it has been necessary for some of the mines to make drastic alterations in order to prevent serious losses.

These alterations consist of running this material to pits which are 15 or 20 feet deep and contain areas of several acres, with overflows of minimum velocities in order that the solids may have ample opportunity to settle to the bottoms. About 7,000 or 8,000 gallons of water, containing about 25 per cent. of extremely muddy solid matter, is delivered to these pits each minute. Dredging pumps which are equipped with long movable suctions, and operate in big semicircles, suck the solid matter from the bottoms along with 2,000 or 3,000 gallons of water per minute, and deliver it back to the hydroseparators, to which has been added several thousand gallons of make-up water for improving the job of classifying and desliming.

The 5,000 or 6,000 gallons of water per minute, which goes to waste in these pits, carries the majority of the slimes and very fine matter with it, thereby giving the hydroseparators ample opportunity to increase their efficiencies to the extent that the former losses have been reduced. Pumps placed adjacent to or under these hydroseparators transport the deslimed and classified material (called heads) to storage bins, from which the recovery plants draw it for final processing.

Flotation and Related Processes.—The heads are drawn by gravity from the storage bins into rake classifiers of large capacities for a final desliming, classification, and dewatering. In some cases, where enormous amounts of mud are encountered, bowls are used in conjunction with rakes to increase the capacities for final cleaning. The reason for the stress on final cleaning is the importance of making an efficient recovery, which can not be obtained from slimy heads. Any

amount of slimes in the heads increases the amounts of reagents consumed and, at the same time, decreases the output and grade of the finished product. Clean heads are essential for maximum production of high grade concentrates.

Some high-grade deposits of pebble phosphates, which are soft and continue to disintegrate as handled through the various processes, not only present a loss through attrition, but are extremely difficult to float because of their slimy nature.

Flotation and similar processes separate particles of phosphate rock from particles of waste (chiefly silica) by mixing them with proper amounts of water and chemical reagents to form oil or soap films around the phosphate particles, and then applying forces that cause the film-coated particles to float. The reagents include fuel oil, pine oil, caustic soda, soap or soap-forming material, such as fatty acids or their derivatives, and similar substances. In practice they are mixed with partly dewatered masses of phosphate and silica particles that were not separated in the latter stages of hydraulic classification. Because of differences in the chemical and physical properties of phosphate and silica, only the phosphate particles retain enough coating of the reagent materials to make them float when subsequent forces are applied to the mixture. These subsequent forces vary greatly.

Some operators dilute the mixture with additional water and send air through the mass while agitating it in a series of containers called subaeration cells. This causes small air bubbles to attach themselves to the film-coated phosphate particles, which float off, leaving the sand particles behind them. Other operators alternatively effect a separation by feeding the water-suspended material to diagonally inclined tables whose smooth surfaces are broken by a series of longitudinal ribs, roughly 5/16 inch high. A small motor jigs each table back and forth horizontally up to several hundred times per minute, causing the sand particles to travel between the ribs toward one end of the table, where they are drawn off as waste. Meanwhile the film-coated phosphate particles rise above the sand in the thin layer of water and flow downward over the ribs toward a lower corner of the table where they are drawn off and saved.

Another method employed is to feed a mortar-like mixture of reagents and wet particles of phosphate and sand to an endless moving belt that carries the material under jets of falling water, while the overflow of all the materials over the side of the belt is partly obstructed by a series of herringhone-shaped baffles. The water jets, the position of the baffles, and the speed of the moving belt are adjusted so that only the film-coated phosphate particles can float and flow off the sides of the belt, where they are collected into a common tub and pumped into storage bins. The particles that remain on the belt after traveling a limited distance under these influences are largely sand, eventually dumped off at the tail pulleys as waste. This method employs two roughing belts and one finishing belt operated as a unit. The material which reaches the ends of the roughing belts is called tailings and goes to waste; that which reaches the end of the finishing belt is called middlings and is returned to the mixers to make another trip through the process.

Practice varies widely in the use of the processes just described. All Florida land-pebble phosphate operators use one or more of these methods in concentrating their fines, and their recovery is often increased to 90 per cent. and higher.

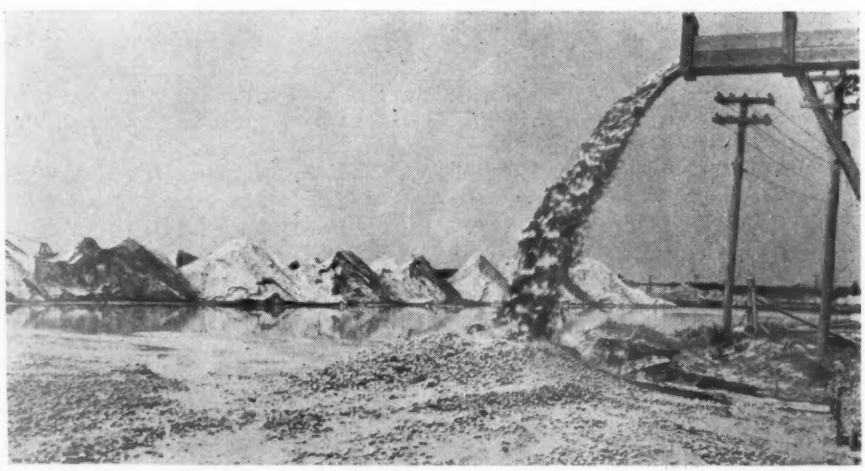
Electrostatic separation has been applied to reclaiming land-pebble phosphate-rock flotation concentrates in Florida. This method is employed in conjunction with the drying plants, and has only been used in further concentrating the finished dried flotation product by a further reduction of the silica content. A full-size electrostatic refining plant was erected and placed in operation the latter part of 1938 by one company in the pebble district. The patent owner of this process claimed that all the "kinks" have been ironed out in connection with the concentration of pebble-phosphate concentrates by the electrostatic method, which is now offered to the operating companies for employment on a royalty basis.

Wooden spillway built at high point in settling system to control water flow.

In addition to increasing the output per man and per kilowatt-hour of power consumed in the washing and recovery operations, improvements in recovery have also reduced the amount of labor and power required in other phases of mining. The most important indirect effects of increased recovery that result in such savings are as follows:

Recovery improvements reduce the amounts of overburden and matrix handled per ton of rock produced and thus save power and labor in the pit operations. Such improvements have prolonged the life of all normally workable deposits and also have enlarged the areas that can be mined economically. Both factors tend to reduce the number of times that washing plants have to be moved from one location to another.

By manipulating selective-concentration processes the operators, within certain limits, often are able to meet market grade requirements without shifting active mining to other locations; whereas to meet such requirements without these processes most of the mining companies have

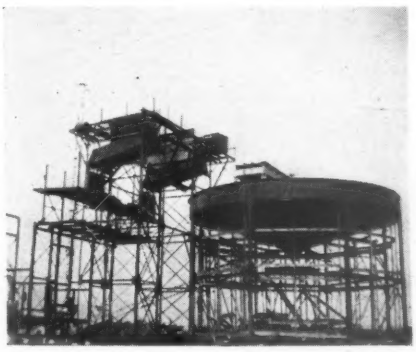


Washing-plant debris being pumped into worked-out area. Note phosphate-containing mud balls in foreground which washing plant failed to disintegrate.

Launder carrying waste from washing plant to settling system.

been compelled to maintain more than one mining operation, and usually none of them were operated continuously for an entire week. The added flexibility of control over the grade of the product obtained in the more complicated concentration processes tends to save man power by concentrating the labor force engaged in pit operations and by simplifying transportation and supervision.

The first problem encountered up-

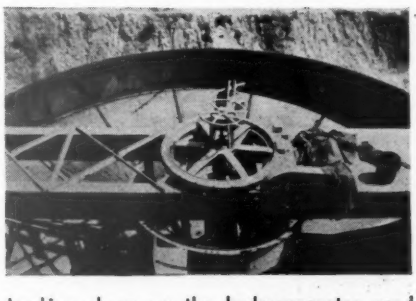


A 40-foot hydroseparator being erected beside washing plant under construction.

on starting a land-pebble phosphate mine in a new location is the provision and assurance of an unaltered water supply for hydraulic mining and washing. This is done by drilling big wells to depths of 800 feet or more, and equipping them with deep-well pumps of large capacities. These wells vary in the amounts of water furnished from about 4,000 to 8,000 gallons per minute. Flowing wells of high sulphur content are frequently encountered in the Alafia and Manatee River valleys. The majority of the mines have several wells located at such elevations that the water can be run by gravity to the mining operations. Reservoirs are constructed by building dams around large areas in which water from these wells is stored for use as needed.

Careful sampling and notation of each stratum encountered while drilling these wells has furnished the Florida Geological Survey with some valuable information concerning the content and construction of the earth's surface, to a depth of about 1,000 feet, in this part of the state.

In addition to supplying and storing enormous amounts of water for a continuous hydraulic-mining operation, it is necessary to settle the mud out of about 10,000 gallons per minute before using it again or letting it off the property and eventually into the Alafia River, and finally into Tampa Bay. During the dry season all this water is continuously used over and over, after being circulated through enormous settling areas constructed at material expense to the operating companies. During the rainy season it is necessary to let the surplus water overflow in order to prevent flooding of the mines. It



Looking down on the hydroseparator used as thickener for concentrating and classifying fines.

is essential that enough settling areas be maintained so that the overflow water will contain the minimum amount of solid matter to prevent the contamination of streams, etc. The fish and game laws of the state are strict in regard to this matter, and in order to keep a check on each operating company an engineer is employed to take samples and make analyses of the water from all the overflow stations each month.

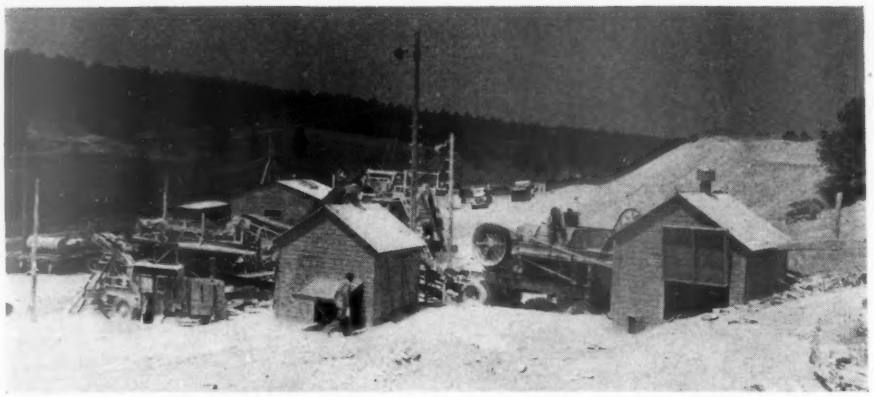
The most important problem encountered upon starting a phosphate mine in a new location is the construction of enormous dams around big areas of barren territory for settling the solid matter out of large volumes of muddy water utilized in the mining, washing and recovery operations. These dams are built with draglines to such a height and width that the water can be carried at high enough levels to make possible its circulation back by gravity through spillways to the site of the washing plants and pumping stations. In some cases this may be several miles. This is strictly an engineering problem and requires ample study and planning previous to the starting of any construction. The first requisite in such a case is an accurate topography of the entire property being developed.

These dammed-up areas sometimes include as much as several hundred acres. The settling capacities are made large enough to take care of the muddy water from the washing plants, long enough for definite areas to be mined out. After that these mined-out pits are added to the circulating systems at regular intervals, thereby insuring a continuous supply of new areas for settling purposes. When a new mine is started adjacent to an old one, the settling problem is greatly simplified in view of the fact that in most cases the old mined-out areas can be further utilized for such purposes. In some cases, where the topography of the terrain is adverse to circulating by gravity, the pumping of large volumes of water from one elevation to another is necessary. However, this is one of the problems of mining engineering which is always overcome, if possible, because the continuous pumping of large volumes of water costs considerable money and adds materially to the final unit figure of production cost.

In the pioneer days, when this part of the country was sparsely populated, little attention was paid to the settling of muddy water from either the hydraulic overburden operations or the washing plants. In

(*Continued on page 47*)

Aggregate for Bomber Base Processed at Local Deposit by Portable Plants



General plant view with primary crusher, scalping screen and reduction crusher in the foreground.

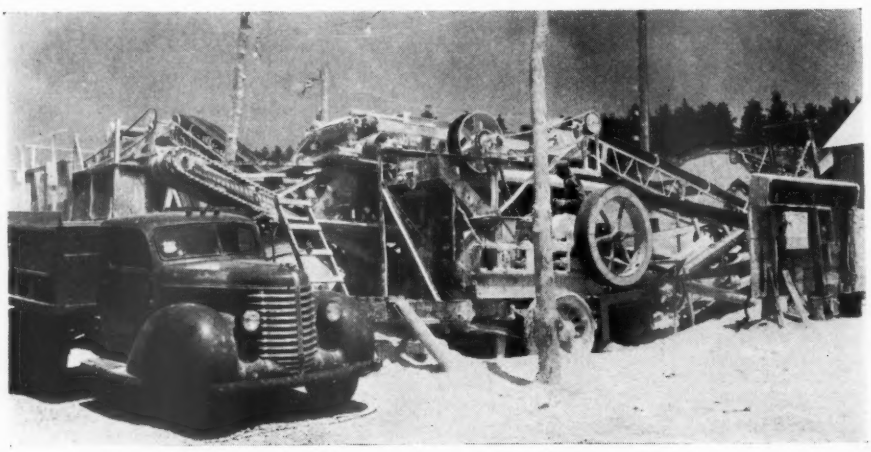
THE part that portable aggregate crushing - and - screening plants are playing in facilitating the construction of war plants, Army and Navy air bases and other important projects, both here and abroad, can not be overestimated. In this country these plants have provided the aggregates necessary for hundreds of vital projects located out of economical shipping range of permanent producing plants. Abroad these plants are producing the materials for jobs about which little can probably be said until after the war is won.

The overseas plants differ only in location from the hundreds being operated in this country, knowledge of which would certainly not give either aid or comfort to the enemy. Such a plant was operated near Rapid City, South Dakota, by the Hills Materials Company, a subsidiary of the Northwestern Engineering Company, to supply 62,000 tons of crushed stone for the Rapid City Air Bombing Base. Most of this stone was used for concrete runways. This plant had produced materials for similar projects in Colorado and Wyoming before it was brought to Rapid City. Production was started on a small scale on January 8, 1942, in order to build up stock piles. Full-capacity operation was begun on April 2, when the construction of this base really got under way and continued until early in August. The plant was held over beyond that date, however, in order to supply materials for other local projects and to build up stock piles for future demands. Morris Adelstine is president of this company. August J. Beka designed the plant layout used and was in charge of production.

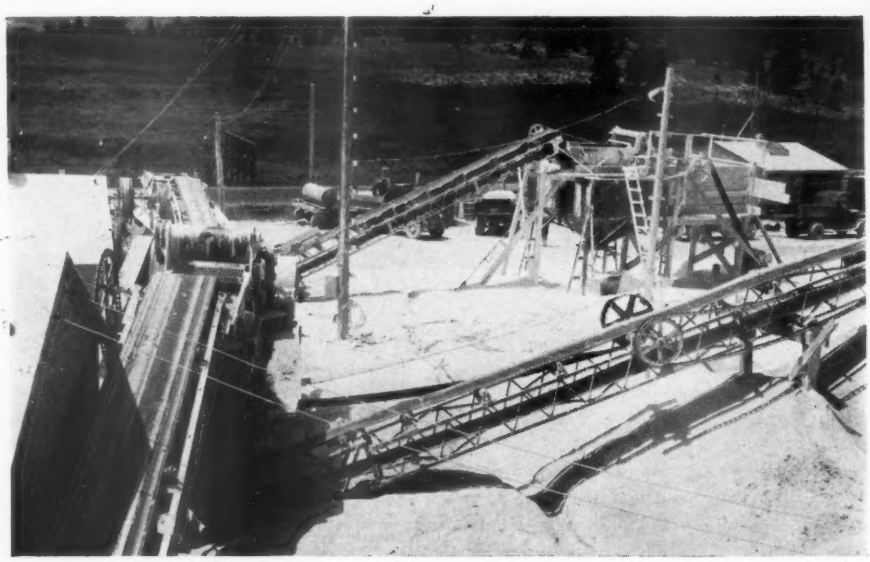
Three sizes of materials were produced to meet government specifications. These were 1½- and ¾-inch rock, and chips. These were produced at the average rate of 78 tons per hour for 20 hours daily and 7 days weekly. The peak production was 93 tons in one hour, not including a considerable quantity of waste fines, fines and dust. A fleet of 11 trucks was used to haul the three desired sizes of material a distance of 13 miles to the air base.

The deposit from which this stone was obtained is a hard lime rock and the quarry is only a short distance from that of the South Dakota Cement Plant. It had previously been operated on a small scale to supply materials for state highways. The formation is badly broken and the light overburden was not removed. This dirt, with that in the rock seams, was wasted with the limestone dust created in crushing.

The 48-foot face was worked in two 24-foot lifts. The drilling was done by a Cleveland wagon drill



This unit does coarse screening and final crushing.



View from primary crusher. Final screening unit at right.

using steel of 1¼-inch maximum gage. With one man on the drill 250 feet of hole was drilled in 8 hours. Another man did the loading and shooting. Usually 60 to 70 holes, with up to 3,000 pounds of explosives, were detonated at one time, bringing down an average of 5 tons of rock per pound of explosive. Du Pont and Hercules 40-per cent. explosives and a blasting machine were used. The blasted rock was well shattered and the small

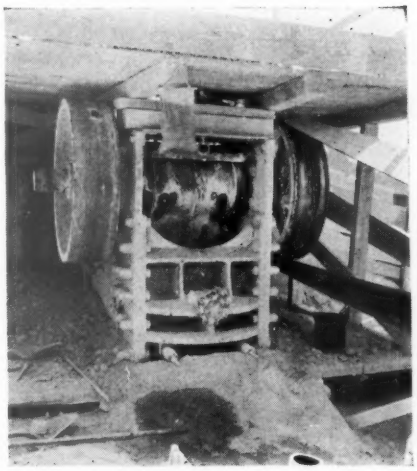
Gasoline shovel loading truck in quarry.

amount of secondary drilling necessary was done by a Cleveland jackhammer.

The explosives were stored in a bullet-proof shed with 6-inch sheet-metal walls lined with sawdust.

One-man-operated wagon drill. It uses 1¼-inch steel.

The stone was loaded by a P & H 600 gasoline shovel with a 1-cubic yard dipper into four 1½-ton trucks —a Ford, a Chevrolet and two Internationals. These hauled the stone a few hundred feet downhill to the plant. An Allis-Chalmers 50 gasoline tractor equipped with a bulldozer was used for cleaning up in the quarry and about the plant.



The 18- by 38-inch primary jaw crusher.

The trucks dumped the rock through a trap into the 18- by 38-inch Austin-Western primary jaw crusher. The minus-3-inch crushed material was carried on a short belt-conveyor to a 3- by 10-foot Iowa Symons double-deck screen. The minus-8-mesh material falling through the bottom deck of this screen was dust and overburden and was carried to a waste pile on a belt-conveyor. The 1½- to 3-inch material passing over the top deck of this screen went to a 10- by 36-inch Pioneer jaw crusher. This crusher and the screen are mounted on the same Pioneer pneumatic-tired chassis.

The minus-1¼-inch product of the crusher and the 8-mesh to 1½-inch material coming off the bottom deck of the screen were carried on a short horizontal belt-conveyor to an inclined belt-conveyor to the second section of the plant which is mounted on an Austin-Western pneumatic-tired chassis. When 1½-inch rock was not needed, a 3½- by 10-foot Nordberg Symons 2-deck screen scalped the ¾- to 1½-inch material over the top deck to a 26-inch Austin-Western roll crusher. A short return belt-conveyor fed the crusher product back on the conveyor to the screen. When 1½-inch rock was being made the roll crusher was by-passed.

The 4-mesh to ¾-inch material passing over the bottom deck, and on occasion the ¾- to 1½-inch rock over the top deck went to a short belt-conveyor for direct loading into trucks.

The minus-4-mesh material falling through the bottom deck was carried on a belt-conveyor to a 3- by 10-foot Iowa Symons double-deck screen over a steel bin. The 4- to 8-mesh material coming off the bottom deck of this screen drops into one compartment of the bin and is used for oiled surfacing. The minus-8-mesh material passing through the bottom deck goes to the second bin compartment. Some of this material was sold as blotter for asphalt pavements and the excess was stock-piled for use in a prospective concrete-brick plant. The small amount of oversize coming off the top deck of this screen went to a separate wooden bin from which it was occasionally trucked back to the plant flow.

The stock-piled material was loaded into trucks by a Barber-Greene crawler-mounted loader and an Eagle Iron Works truck-mounted loader. The latter machine moves under its own power from job to job.

The plant is electrically driven throughout with the exception of the final conveyor and screen which are driven from the same International gasoline engine. The primary crusher is driven through a flat belt by a 75-horsepower motor. The secondary crusher is driven through a flat belt by a 100-horsepower motor and in turn drives the scalping screen, its feed conveyor, collecting conveyor and waste conveyor. The final roll crusher is belt driven by a 150-horsepower motor which also drives the feed conveyor, the sizing screen, the loading conveyor and the return conveyor. The three screens were driven through Goodyear Goodflex V-belts. All the other drives were flat belts or chain.

Phosphate (from page 45)

many cases where the mining operations were near a stream, clear water was taken from above and the muddy water dumped back below. Consequently, the river valleys and tributaries became vast bogs and the streams and lakes were contaminated to the extent that thousands of fish were exterminated and many range cattle bogged down and perished. At that time the facilities for building dams or digging canals were limited to mule-drawn scrapers or hand shovels. As more people settled and the country became more civilized, injunctions were filed and legislation enacted which put an end to the practice. About this time small draglines were beginning to appear on the market and these greatly facilitated the construction of settling areas, in spite of the fact that they were inefficient and not dependable. Too, power shovels and later big draglines were substituted for the hydraulicking of overburden, which reduced the necessity for such large settling areas.

Industrial Sand Producers Meet in Chicago; Re-Elect Officers

FOLLOWING a meeting of the board of directors on the morning of June 3, members of the National Industrial Sand Association gathered at the Palmer House, Chicago, for their eighth annual convention. The sessions, which continued through June 4, provided opportunity for the discussion of many subjects of interest to producers of various types of industrial sand.

With reference to price control, Executive Secretary V. P. Ahearn pointed out that MPR (Maximum Price Regulation) 327, which deals with nonmetallic minerals and requires the filing of reports, contains a long list of minerals including "flint." Officials of the OPA have decided that ground sand is not included under the term "flint," so that the industrial-sand industry is not subject to the provisions of that regulation. However, the industry is covered by the GMPR (General Maximum Price Regulation) as well as MPR 188, which has set specific prices for certain industrial-sand products, such as a maximum price of $2 per net ton in Tennessee for sand containing a minimum of 98.5 per cent. silica.

Edward W. Bauman, technical adviser, Nonmetallics Branch, Mining Equipment Division, War Production Board, Washington, was present and, in addition to addressing the first session of the convention on problems confronting producers in connection with Limitation Order L-269, made himself available to individual producers for consultation on special problems facing them. He said that Limitation Order L-269 gives authority to schedule delivery of completed equipment. He referred also to the letter sent out on May 20 dealing with allotments for the third quarter of 1943 under PD-400-C.

There is a tendency and a trend, he said, toward the lowering of the ratings available for the purchase of new equipment, which is becoming more and more critical. There are enough industrial-sand plants in operation to produce the materials needed. He urged those present to give very careful consideration to their need for new equipment before filing applications for the ratings needed to obtain it.

Trucks, said Mr. Bauman, are certain to be scarce for none are being made, but the industrial-sand industry will gets its *pro rata* share.

On this subject, Carl Kelly, division head of the Mining Equipment Division of WPB in the Chicago regional office of WPB, said that only 30,000 trucks are left in the nation's pool and that some provision for making more trucks available for essential civilian needs probably will be made.

The situation with respect to mine trailers, said Mr. Bauman, has eased to the extent that it is now possible to get some. The Mining Equipment Division, he added, has issued some orders—special directives—for tractor parts. Deliveries are getting better.

C. R. Megee, manager of the Open Top Section, Car Service Division, Association of American Railroads, spoke of some of the problems of car shortages created by the war. He cited the increasing needs of different industries as explaining the increasing difficulties of getting open-top cars when and in the number wanted. The coal industry, as an example, produced 580,000,000 tons of coal in 1942—the largest annual output in history—and is expected to produce 600,000,000 tons this year despite temporary stoppages in production.

In normal years, according to Mr. Megee, the average length of haul for a ton of freight has been 351 miles; last year it was 449 miles. A 30-day delay in the opening of lake shipping, due to the lateness of the season, has resulted in the transfer to the railroads of large and unexpected tonnages for shipment. Whereas 21,000,000 tons of iron ore had been shipped in lake boats by May 31, 1942, only 13,000,000 tons had been transported by the same means and by the same day of this year.

The speaker expressed his confidence that the railroads would be able to furnish all the open-top equipment—gondolas and hoppers—needed by the industrial-sand industry, if producers would coöperate as much as possible by releasing equipment quickly, by cleaning their returned cars, and in other ways.

War Production Board orders covering the use of shipping containers were discussed by A. Y. Gregory, New York City producer and treasurer of the association. P-140, which covers wood and fiber containers, sets an AA-2X preference rating on containers in those categories. Under M-221, which deals with textile bags and paper shipping bags, producers are limited in 1943 to the use of 50 per cent. of the bags they used in 1942. New cotton bags can be used, he said, but no new burlap bags. There are no restrictions on the printing on bags.

Mr. Bauman stated that industrial sand is assumed to be included under "Abrasive Sands" in Bulletin 12 of the Selective Service System. The War Manpower Commission has written to its field directors saying that "abrasive sand" shall be understood to include industrial sand. Bulletin 12, is being revised.

The Friday morning session was devoted to labor problems and much of the time was occupied by a discussion of the Grand Rapids Gravel case, the decision in which was reported in PIT AND QUARRY for May, page 47. By this decision all motor-truck owner-drivers are considered, for the purpose of social-security taxation, as employees of the companies for which they do the major part of their hauling. Mr. Ahearn advised those present to watch most carefully the tax status of those persons who haul for them and whose social-security taxes are not being paid by some other employer or user of their services lest they expose themselves to this tax liability. The application of the social-security law is being broadened. He said that the Grand Rapids Gravel decision emphasizes the obligation of producers to deduct the new 20 per cent. withholding tax even in the case of owner-drivers, who now, according to that decision, stand in the relationship of employees to those who make major use of their services.

New regulations to cover accelerated depletion have been drafted, Mr. Ahearn announced, and copies will soon be available.

In its dealings with local draft boards, where occupational deferment is sought for key employees, difficulties are being encountered because the industrial-sand industry is not specifically named in the list of essential industries in the Selective Service System's occupational bulletin. These troubles would largely be eliminated, in the opinions of those present, if the industry were to be listed as one entitled to preferential consideration because of its essential character. Mr. Ahearn urged upon his listeners the wisdom of immediately analyzing the position of every one of their necessary employees under 38 years of age and of

(*Continued on page* 121)

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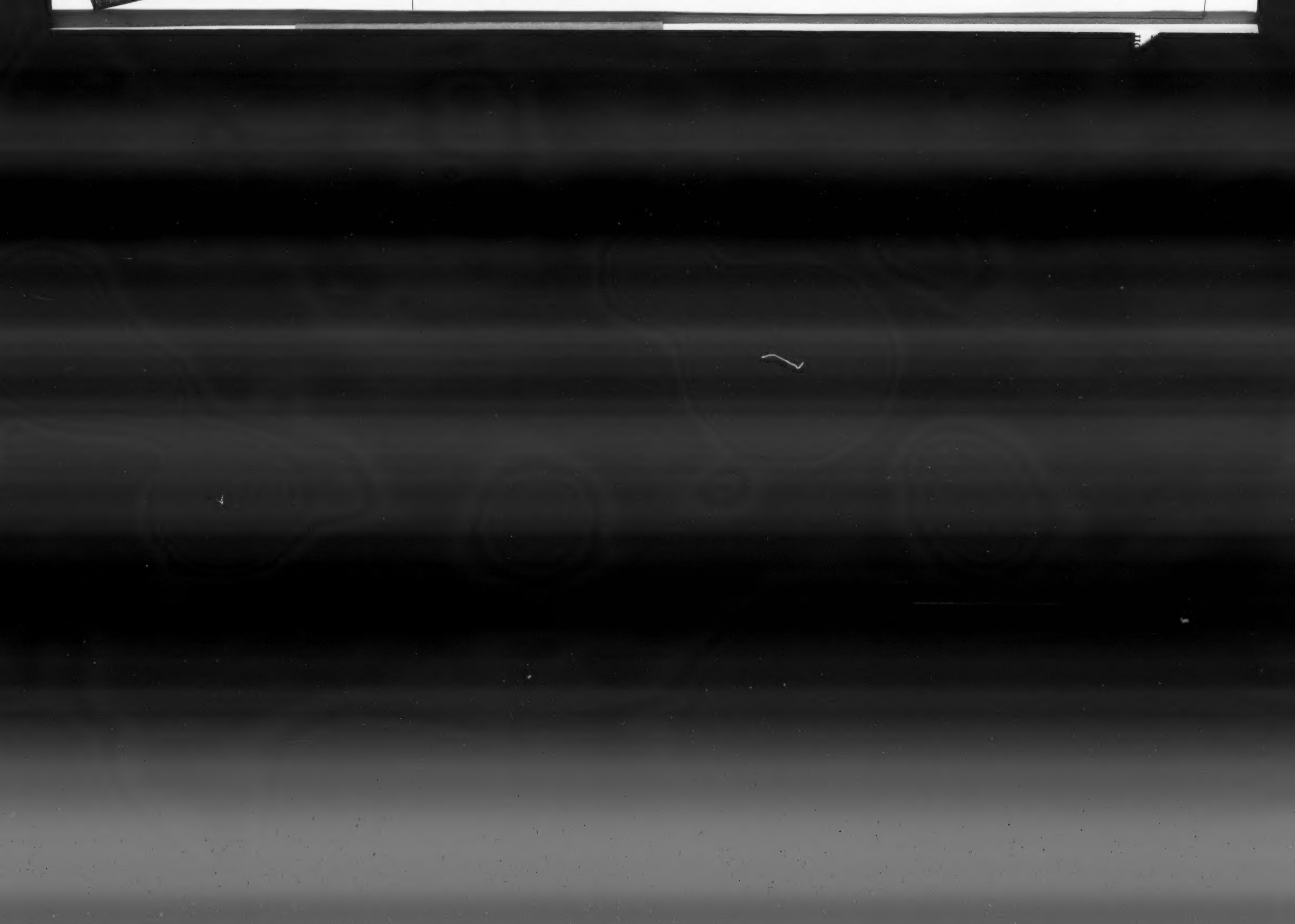

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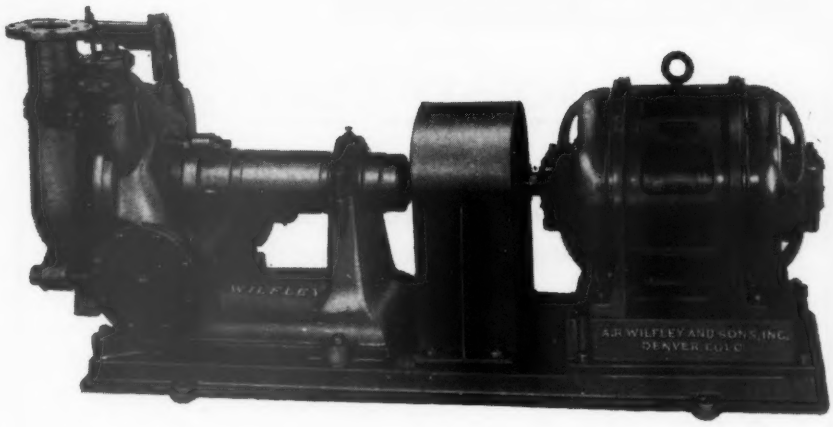

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Cement Kilns Being Utilized To Make Lime and Other Vital War Materials

THE cement industry has responded with gratifying speed to the suggestion made by the WPB on March 24 that idle cement kilns be used for the production of other vital materials of which there has been a shortage. Some plants, of course, have been doing this for some time, but others are doing, or are considering doing, this type of work for the first time. Obviously the production of chemical lime, bauxite, beneficiated iron ore, alumina, phosphate and magnesium by cement plants would normally be an uneconomical procedure for various reasons and it is doubtful if most of the cement-plant operators involved have any intention of continuing in these temporary markets in competition with the established producers who operate plants specially designed for the production of these materials.

Most of the plants being converted will manufacture chemical quicklime which is badly needed by many war industries. The plants of the Lehigh Portland Cement Company at Buffalo and the Cumberland Portland Cement Company at Cowan, Tennessee, are just going into production on this material. Already in production are the plants of the Peerless Cement Corporation at Port Huron, Michigan, and the Missouri Portland Cement Company near St. Louis. Both these operations are described in some detail later in this article.

The Trinity Portland Cement Company's plant at Houston, Texas, produced a few thousand tons of lime during the recent record floods which seriously interrupted the production of lime for the aluminum industry. This was only an emergency measure, however, and this plant is now again producing only cement.

One of the latest developments affecting the industry is the announcement that two cement companies are building new plants for the production of alumina (aluminum oxide). The Volunteer Portland Cement Company, Knoxville, Tennessee, will build and operate a $2,650,000 plant near Harleyville (Dorchester County), South Carolina which will use a special process with clay and lime as basic raw materials. It is reported that the American Nepheline Corporation is also interested in this project.

The Monolith Portland Midwest Company, Laramie, Wyoming, is reported to be completing similar arrangements for a local plant to produce alumina from native raw material. This project will cost about $4,000,000. Both developments will be financed by the Defense Plant Corporation.

One of the first companies to enter these new fields was the Federal Portland Cement Company which has a plant at Buffalo, New York. Over a year ago one kiln was converted for nodulizing iron ore and has since been in steady operation. As the demand for cement dropped off the stock of cement at this plant has been built up to a point where it is expected that a second kiln will be nodulizing iron ore by July 1. This process, while new to the cement industry in this country, has been practiced in England, France, Belgium, and other European countries for some years.

The Valley Forge Cement Company, West Conshohocken, Pennsylvania, is nodulizing a very finely divided iron and the Allentown Portland Cement Company, Evansville, Pennsylvania, is reported to be in the experimental stages of some type of conversion plan.

Ford Motor Another pioneer in the conversion from cement manufacture is the Ford Motor Company which has for nearly two years been using its cement plant at Dearborn, Michigan, for the treatment of dolomitic rock prior to actual magnesium smelting. The rotary cement kilns are used for reducing the magnesium ore or dolomite, which is then converted into metallic magnesium by the ferrosilicon process.

The rock used is obtained in northern Michigan and is delivered to the plant in prepared sizes from one-half to one inch in diameter. It is dumped from railroad cars into bins from which a belt-conveyor feeds it into the two 10- by 150-foot rotary kilns. This conveyor by-passes the raw-grinding department and is the only major change necessitated by this conversion. The kiln temperature is varied between 1,900 and 2,600 degrees F. depending on the nature of the stone. The decarbonated dolomite falls from the kilns into the two 8- by 60-foot rotary clinker coolers and is carried by a bucket-conveyor to the finish-grinding department. There the dolomitic lime is fed with 75-per cent. ferrosilican at a ratio of about 6 to 1 into the mills, which perform the dual function of grinding and mixing these materials. The product is then stored in bins from which it is hauled away for briquetting and further processing in other departments of this huge Ford industrial development.

Peerless Cement Since April 28, 1943 the Port Huron, Michigan, plant of the Peerless Cement Corporation has been producing lime instead of Portland cement. The conversion of this cement plant to lime manufacture is purely a temporary measure brought on by war conditions and was resorted to because of the huge demand by makers of alloy steels and other critical war metals for increased amounts of lime at a time when the demand for cement was receding sharply due to curtailed building.

Only pebble lime is being produced at the Port Huron plant, the entire output being marketed by the Marblehead Lime Company of Chicago. The change-over was made with the minimum of delay and rearrangement of existing equipment so that cement production can be resumed at some future date with corresponding rapidity.

The same self-unloading vessels which formerly brought in the cement rock from the plant of the Michigan Limestone & Chemical Company at Rogers City, Michigan, are supplying the stone for lime manufacture. The stone still comes from the same source, but instead of being ¾-inch minus material, as was the case when cement was produced, the raw material is now 1¾-inch washed stone. The boats unload at the rate of 2,000 tons per hour to a hopper at the Peerless dock on the Huron River. A belt-conveyor feeds at the same rate to the storage building, which has a capacity of 18,000 tons.

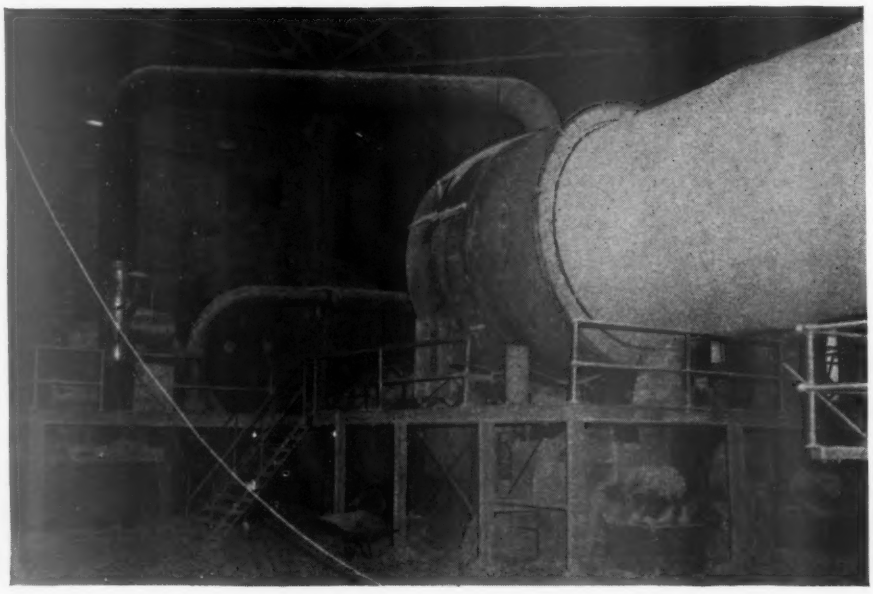
The 1½-ton overhead crane, which formerly transferred the stone to bins which supplied the cement

How Peerless Cement Plant at Pt. Huron Was Converted to the Production of Lime

The picture at the top shows how the stone is transferred directly from the storage building to the rotary kiln by a 151-foot belt-conveyor. The stone is fed to the belt by a gate in the roof of the concrete tunnel which was constructed on the storage-building floor after the conversion from cement to lime production was decided upon.

The firing end of the 400-foot kiln is shown in the picture at the bottom of the page. Note that the wind box and grates of the recuperator, used when cement clinker was produced, have been removed and a rotary cooler, visible directly below, has been installed to cool the lime more slowly. At the left in the picture is the direct-firing mill which supplies fuel to the kiln.

Reading downward, the three smaller pictures at the right show (1) the discharge end of the 60-foot rotary cooler, with elevator to truck-loading bin at left; (2) dump truck being loaded with pebble lime for transportation to the storage silos; and (3) end view of the silos with truck dumping into hopper. The small structure at the top houses the vibrating screen.



raw mills, now keeps the stone piled above a 40-foot inclined concrete tunnel in which a newly-installed 24-inch by 181-foot belt-conveyor carries the stone to the feed end of the rotary kiln. This tunnel, 7 feet high and 7 feet wide, was constructed last spring after the decision to produce lime was made. A hopper with manually-operated vertical and horizontal gates controls the flow of the stone on the belt. After some experimentation the speed of belt travel was set at 51 feet per minute—equivalent to 85 feet per revolution of the kiln. A power take-off from the kiln drives the belt through chains, thus keeping the feed from the belt to the kiln synchronized.

The 11- by 400-foot kiln was placed in service just two years ago and was made by joining the two original 11- by 200-foot Traylor kilns which had been in parallel service for a number of years. The two 100-horsepower motors which formerly drove the two shorter kilns were synchronized to drive the reconstructed 400-foot kiln. (*P&Q*, February, 1942, pages 34 to 36.)

When operated to produce cement clinker, the kiln was equipped with 884 lengths of heat-transfer chains in the feed end. When the kiln began turning out lime these chains were removed on the advice of experienced rotary-kiln lime manufacturers. Exhaust temperatures were found to be higher than were expected, however, and about half of the chains were put back. This corrected the condition and brought the exit-gas temperature down to the more efficient figure of about 700 degrees F. The kiln has a pitch of ½ inch per foot and, operating at a speed of one revolution in 1⅔ minutes is producing about 300 tons of lime daily from a raw feed of 600 tons. Before putting the kiln in production on lime, a small portion was relined; otherwise the original lining used when burning cement clinker is still in service.

The baffled dust-chamber and flue formerly used to conduct the kiln gases to the two 15- by 155-foot concrete stacks is still being used, as is the spray-washing system located in the breeching connecting the flue to the two stacks.

At the time the kiln was lengthened a Type S Vanderwerp recuperator was installed on a 13-foot diameter extension of the 11-foot kiln shell. While the recuperator cooled the clinker satisfactorily and effected important economies in fuel consumption, it was abandoned after a short trial with lime production and a 6- by 60-foot Allis-Chalmers rotary cooler was substituted. Only the wind-box and grates of the recuperator were removed, however, so that it can quickly be re-assembled when cement production is resumed. Designed, of course, to cool cement clinker at a rapid rate, the recuperator caused objectionable scaling of the lime which requires considerably slower cooling after calcination and the new rotary cooler is doing a very effective job.

The kiln continues to be fired by a Raymond direct-firing bowl mill with a capacity of 4 tons of coal per hour.

Since lime has been produced but a short time, detailed and accurate operating figures are not yet available. W. L. Kaiser, vice-president and works manager, estimates, however, that the fuel consumption is varying between 3½ and 4 tons of coal per ton of lime produced. Coals of various analysis and B.t.u. contents are still being tried. The calcination temperature for the lime is about 2,400 degrees F. compared with 2,800 for cement clinker.

The lime discharged from the cooler is carried up to a 20-ton steel truck-loading bin by an elevator that was formerly used to handle clinker. This bin and the discharge end of the rotary cooler are located in the clinker-storage building.

At present, a 4-ton Ford dump truck transports the lime from the bin to the storage silos several hundred feet distant. It is discharged by the truck into a hopper at the end of the bank of 26 silos and carried to the top by two 120-foot Link-Belt elevators. The last four of the storage silos are being used for lime storage, their capacity being 600 tons each. A 4- by 8-foot single-deck vibrating screen above the silos separates the pebble lime into plus-¼-inch and minus-¼-inch products. Two of the silos store the larger size and two the smaller. A double-deck screen will probably be installed soon to make three sizes of finished product. Another proposed change is the substitution of a picking belt to carry the lime from the cooler bin to the silos. The trucking method was adopted merely as the simplest and quickest way to get the lime into storage and has recognized disadvantages.

Car-loading gates have been installed in the four lime-storage silos and most of the lime is loaded into covered hopper cars and box cars for shipment. Some truck shipments have been made, however, to points in eastern and central Michigan. Some of the product is also being packed in paper bags.

The Peerless Cement Corporation has another plant in Detroit which is continuing to produce Portland cement. Thousands of barrels are also in storage in the silos at Port Huron and shipments are being made regularly. In recent years all but a small part of the cement shipped from Port Huron has been transported in special bulk-cement trucks.

Missouri Portland The Missouri Portland Cement Company is helping to alleviate the shortage of high-calcium chemical quicklime in the Mississippi Valley area by converting part of its facilities near St. Louis for its manufacture. The kiln in its Number 2 plant began to burn lime on June 1 and two of the four kilns of Plant Number 1 will go into operation on this material on July 1 and July 10, respectively. Together these kilns are expected to produce about 700 tons of quicklime daily, making this plant one of the largest producers in the country, and probably alleviating the shortage in this area. It is obviously impossible for a cement plant to produce lime at a cost comparing with that of plants especially designed for this purpose, but the company has taken these steps to aid in the war effort and to keep busy men and equipment which would

(*Continued on page* 73)

Two plants of Missouri Portland Cement Company near St. Louis which are now producing lime.

Lepol Kilns, Nodulizers Among Santa Cruz Plant Improvements

another ON THE SPOT report

THE PLANT of the Santa Cruz Portland Cement Company at Davenport, California, has been the scene of many interesting developments in cement-plant technology and operating methods. These have been part of a comprehensive improvement program which, over a period of years, have affected almost every department of the plant. These improvements have been faithfully recorded over a period of many years in these pages and this article brings them up to date. The latest addition is a new all-steel and concrete rock-drying and blending department which was completed late in the summer of 1942. Late in 1941 the installation of two Lepol kilns with Fuller grate-type clinker coolers was completed along with a new clinker-storage building and other improvements. These kilns replaced six of the original fourteen 125-foot rotary kilns installed when the plant was built in 1907.

The new rock-drying and blending department has a capacity of 300 tons per hour, resulting in much-needed additional capacity, more economical operation, and better blending of the raw materials. The old department was operated until the new one went into operation and was then torn down.

Rotary and grate sections of one Lepol kiln with drive of former in foreground.

In making these alterations the original crusher building was not changed. Its minus-4-inch product is now discharged on the 36-inch by 282-foot belt-conveyor which is the first step in the new department. From this the stone is discharged on a 36-inch by 200-foot shuttle belt-conveyor set at right angles to it and 42 feet above the ground level. This conveyor in turn discharges the stone on a stock pile throughout a distance of 100 feet toward the drier building and 183 feet in the opposite direction. The different grades of stone are kept segregated in this storage.

When the stone happens to be of the desired analysis for kiln feed it can be discharged from the shuttle conveyor direct to the driers through chutes.

Under the stock pile is a concrete tunnel with 20 openings through which the stone can be discharged on the 36-inch by 400-foot reclaiming belt-conveyor. At present two Jeffrey-Traylor electric vibrating feeders and three belt-type feeders under selected openings are used to rough-blend the stone going to this conveyor, which is inclined at its discharge end to a split chute that controls the feed of the stone into the two driers.

The 9- by 80-foot Hardinge Ruggles-Coles direct-fired rotary driers are unlined but are equipped with lifters for their full length. They are fired with fuel oil by Ray burners through air-heating chambers

The nodulizer which prepares raw materials for the two Lepol kilns.

Conveyors which distribute crushed stone to storage.

and are driven by 125-horsepower motors through Pacific gear reducers. Each drier has a 55,000-c.f.m. Clarage Size 53 draft fan which draws the hot gases through a Multiclone dust-collector and Norblo cyclones which were part of the old drier system. This system of dual collection keeps the new department practically dustless and is expected to prolong the life of the fans and pipes considerably.

The dried rock is discharged from the driers over two 3½- by 10-foot Symons (Los Angeles) two-deck screens. The high-grade coarse rock coming off the two decks of these

Feed arrangement over one Lepol kiln. Stack at left.

screens is carried on separate 24-inch by 180-foot belt-conveyors to 24-inch by 93-foot shuttle conveyors over the five new reinforced-concrete stone-storage silos. These silos are 36 feet in diameter and 60 feet high and have a combined capacity of 15,000 tons. They were built by the Dinwiddie Construction Company.

The flat bottoms of these silos have center openings through which Jeffrey-Traylor vibrating feeders discharge the stone on a 30-inch by 215-foot belt-conveyor. This has a Stearns magnetic head pulley which removes tramp iron before the stone is discharged into the No. 7 Symons standard cone crusher in the secondary-crusher building.

The finer rock passing through the bottom decks of these screens contains a small amount of clay and shale which make it a somewhat

One of the grate-type clinker coolers and its draft fan.

lower grade of material. This is carried on a 24-inch by 160-foot belt-conveyor to a 24-inch by 72-foot shuttle belt-conveyor which discharges it into any of six 325-ton bins which formerly received the entire output of the three old driers. The reclaiming belt-conveyor under these bins, which formerly fed all the rock to the Symons crusher, now by-passes it and discharges this material on a short cross belt-conveyor to the main belt-conveyor from the crusher to the raw-material preparation department. A second rough blending of these two grades of rock is obtained when they are withdrawn from their silos and bins. All these

Control board for the Lepol kilns.

conveyors are of Stephens-Adamson manufacture and are driven by Westinghouse motors through Pacific speed-reducers or by gear-motors.

In 1941 an installation was made for adding iron scale to the rock when needed and this has not been changed. The scale is stored in a small building and is dumped from a concrete-type buggy into a bin under the floor. A belt-feeder is followed by a belt-conveyor which discharges this material on the above-mentioned main conveyor along with the other raw materials.

There have been no changes in the raw-grinding department since the fourth Hardinge conical mill was installed in 1940. [See PIT AND QUARRY, January 1941, pages 78 to 80.] A pair of 10-inch Fuller-Kinyon pumps feeds the finished raw material to separate storage sys-

The new stone-drying building and 15,000-ton stone-storage silos.

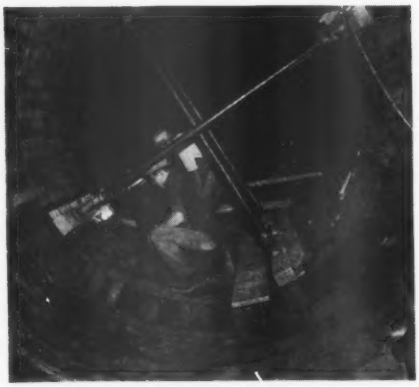
Pump which feeds raw materials to one of the grate-type kilns.

tems for the old rotary kilns and the two new Lepol kilns.

The finished raw material for the two Lepol kilns is stored in eight 15- by 50-foot concrete silos holding 335 tons each. A final blending is obtained when this material is withdrawn from their conical steel bottoms by two 7-inch Fuller-Kinyon pumps. Aerating pads in these silos insure free flowing of this material. The outlets of the Fuller-Kinyon pipe-lines are equipped with Norblo dust-collectors.

The finished raw material is pumped into the two 8-foot 10-inch by 18-foot Lepol cylindrical nodulizers which, with the kilns, are similar in design and operation to the installation made by the Spokane Portland Cement Company in 1935. [See PIT AND QUARRY, January 1936, pages 80-90.] The nodules are formed by the tumbling action in the drum and by the correct adjustment of the speed of the drum and the flow of the water which is sprayed on the material. The nodules have a maximum size of one inch but average considerably smaller. They are formed most satisfactorily when the moisture content is about 14 per cent.

The nodulized material drops into hoppers from which special rotary feeders discharge it on the 12- by 40-foot traveling grates of the Lepol kilns. The grate section of each kiln is 47 feet 6 inches long and 12 feet wide. The cylindrical section of each kiln is 112 feet long and 11 feet 3 inches in diameter and is of all-welded construction. General Refractories "Ritex" magnesite brick is used in the burning zones of these kilns. The draft for each kiln is induced by a No. 13 Buffalo fan from the rotary section through the grate and its single unbaffled chamber and out through a single opening to its individual steel stack. The dust loss is negligible. These kilns have standard hoods and are fired with fuel oil by Ryder Engineering burners. The amount of material passing through the grates is about 5 per cent. of the total kiln feed and is fed with the raw feed to the nodulizers by the 7-inch pumps.

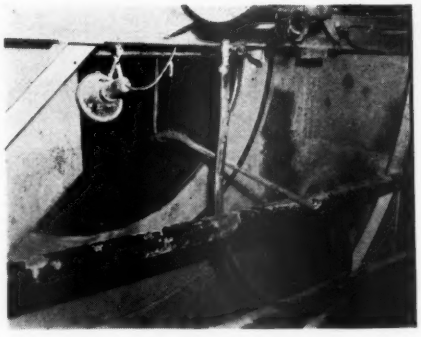


Lining burning zone of kiln with magnesite brick.

Fan for one of the grate-type clinker coolers.

The clinker is discharged from these kilns into Fuller 6- by 20-foot grate-type air-quenching clinker coolers each with a single and unbaffled chamber.

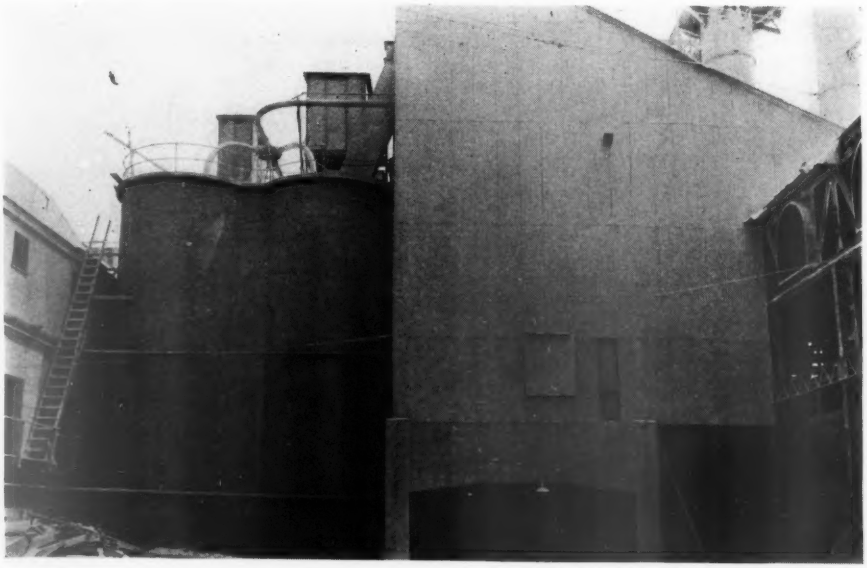
Both kilns and their coolers are controlled from a single Westinghouse board on the burner floor. The instruments inside a glass chamber include individual Leeds-Northrup Rayotube pyrometers and indicators and Micromax temperature indicators for each kiln and a Micromax grate-speed indicator for both kilns. Outside the chamber are Leeds-Northrup automatic dampers for cooler stack control, Bailey 6-point draft indicators, switches, and a Leeds-Northrup master temperature controller and indicator with readings at the exhaust fan, the drying zone above the grate, the cold-air mixing chamber, the calcining zone below the grate, the kiln hood, and the calcining zone above the grate.



Material being discharged from nodulizer into one of the grate-type kilns.

Each of these kilns has been producing an average of 1,700 to 1,800 barrels of standard Portland cement clinker daily with an average consumption of less than 5½ gallons of 148,000-B.t.u. No. 47 Bunker C fuel oil. Over extended periods a figure as low as 4.86 gallons or 697,000 B.t.u. per barrel has been attained.

(*Continued on page* 58)



Raw-material storage silos with dust-collector above and kiln building at right.

GRINDING AIDS FOR PORTLAND CEMENT

another P-Q and exclusive

THIS PAPER presents the results of a series of tests run at Kansas State College to determine, first, the effect of several grinding aids on the rate of grinding of a Portland cement clinker and, second, the effect of these grinding aids on the durability of concrete specimens made with cements containing them.

One brand of clinker was used for the entire series of tests. This clinker was that used by a Kansas cement plant to make its normal Portland cement. Cement from this plant has been used extensively in this state with uniformly good results.

The grinding aids used were Vinsol rosin, cod oil, beef tallow, Nopco 1900, Nopco Plastol No. 1, kojic acid, aluminum stearate, and powdered aluminum. The quantity of grinding aid used was 0.07 per cent. in every case. The grinding was done in a small laboratory mill. Fifty pounds of clinker was ground at one time. The fineness was determined by a Wagner Turbidimeter. Three and one-half per cent. of gypsum was included in all the cements except one.

The effectiveness of a given grinding aid was measured by the number of revolutions of the mill necessary to increase the specific surface from 800 to 1,800 square centimeters per gram. A curve was plotted to obtain this number. By adding 700 revolutions to this number the approximate total number of revolutions required to produce a surface area of 1,800 was obtained.

By E. R. DAWLEY
Professor of Engineering Materials, Kansas State College

Table I.—GRINDING DATA.

Grinding Aid	Final Surface Area of Cement sq. cm. per g.	Revolutions Necessary to Increase Surface Area from 800 to 1,800 sq. cm. per g.	Calculated Revolutions for a Surface Area of 1,800 sq. cm. per g.	Revolutions Saved by the Grinding Aid	Percentage of Revolutions Saved
Vinsol rosin	1,770	1,840	2,540	1,225	32.5
Cod oil	1,815	1,970	2,670	1,095	29.0
Beef tallow	1,750	2,025	2,725	1,040	27.6
Nopco 1900	1,795	2,110	2,810	955	25.4
Nopco Plastol No. 1	1,840	2,125	2,825	940	25.0
Kojic acid	1,828	2,140	2,840	925	24.6
Aluminum stearate	1,880	2,160	2,860	905	24.0
Blank (3.5 per cent. gypsum but no grinding aid)	1,821	3,065	3,765	000	00.0
Powdered aluminum	1,821	3,310	4,010	— 245	— 6.5
No gypsum and no grinding aid	1,780	3,500	4,200	— 435	—11.6

Table II.—PHYSICAL TESTS OF THE CEMENTS.

Grinding Aid	Normal Consistency (*percentage water by weight*)	Time of Set (*hours and minutes*)		Pat Soundness Test	Soundness Test in Autoclave (*percentage growth*)	Tensile Strength (*pd. per sq. in.*)	
		Initial	Final			At 7 days	At 28 days
No gypsum and no grinding aid	31.0	10:00	20:00+	Failed	[1]	335	383
Blank—3.5 per cent. gypsum but no grinding aid	23.5	2:40	5:00	O. K.	0.0970	433	497
Cod oil	27.0	2:50	6:00	O. K.	0.1555	382	453
Nopco 1900	25.5	3:10	5:00	O. K.	0.1045	392	445
Nopco Plastol No. 1	27.5	3:10	5:55	O. K.	0.1140	387	453
Beef tallow	27.5	3:00	6:00	O. K.	0.1240	397	463
Kojic acid	25.0	2:30	4:45	O. K.	0.1020	408	488
Metallic aluminum	23.5	2:45	5:45	O. K.	0.0910	320	390
Vinsol rosin	26.0	2:45	5:35	O. K.	0.1100	362	483
Aluminum stearate	25.0	2:30	5:15	O. K.	0.1205	407	525

[1] The set of the cement in the specified time was not sufficient to allow the beams to be removed from the molds intact and undamaged.

Table III.—CONCRETE MIX DATA FOR THE STRENGTH AND DURABILITY SPECIMENS: MIX 1:4 BY VOLUME.

Grinding Aid	Specific Surface of Cement (*sq. cm. per g.*)	W/C by Volume	Slump in Inches (*12-in. cone*)	Weight of Fresh Concrete (*pd. per cu. ft.*)	Average 28-day Compressive Strength of Each Four, 3-by 6-in. Cylinders (*pd. per sq. in.*)
Kojic acid	1,828	0.79	1.5	150	7,440
Aluminum stearate	1,880	0.83	1.3	152	6,540
Cod oil	1,815	0.80	1.4	148	6,330
Blank—3.5 per cent gypsum, but no grinding aid	1,821	0.78	1.6	152	6,050
Beef tallow	1,750	0.80	1.3	151	6,030
Nopco Plastol No. 1	1,840	0.80	1.5	150	5,390
Vinsol rosin	1,770	0.80	1.3	145	5,180
Nopco 1900	1,795	0.79	1.4	148	5,020
No gypsum and no grinding aid	1,780	0.92	1.5	148	4,170
Metallic aluminum	1,821	0.78	1.3	151[1] 139[i]	2,600

[1] 151 pounds per cubic foot was the weight immediately after mixing the mortar.
[i] 139 pounds per cubic foot was computed from the percentage of bulking at the end of 2½ hours.

Table I shows the cement-grinding data. The grinding aids are here listed in the order of decreasing effectiveness. The blank grind contained 3.5 per cent. gypsum, but no grinding aid. Each of the other cements was compared with this one. Two of the cements, one ground with powdered aluminum and the other with no gypsum, required more mill revolutions than the blank to produce 1,800 specific surface. This indicates that perhaps gypsum could also be listed as an aid in grinding, while powdered aluminum is a detriment. Vinsol rosin is seen to be the best grinding aid from the standpoint of reducing mill revolutions with this particular clinker.

Table II shows the test results of the various cements. The various grinding aids exerted a considerable influence on all the properties measured. Only the aluminum stearate gave as high a 28-day strength as the blank, and none of the grinding aids gave as high a 7-day strength. Cement made with no gypsum and no grinding aid was unsound.

Concrete specimens were made from each of these ten cements to determine strength and durability. The strength specimens were 3- by 6-inch cylinders, while the durability specimens were 2- by 2- by 11¼-inch beams. The aggregate used was gravel from Elgin, Illinois; its maximum size was ¾ inch. A straight-line gradation was used.

Table III shows the properties of the concrete mixes used. The grinding aids are listed here in the order of decreasing 28-day compressive strengths. The water-cement ratio required to produce approximately a 1½-inch slump varied somewhat

with the various grinding aids. The weight per cubic foot also varied somewhat, and the 28-day compressive strength of the 3- by 6-inch cylinders varied considerably. A comparison of this table with Table I shows that the best grinding aid, Vinsol rosin, did not produce the strongest concrete. Moreover, except for powdered aluminum, Vinsol rosin produced concrete of the lowest density. Kojic acid, aluminum stearate, and cod oil definitely improved the strength. Beef tallow showed little effect, and the others decreased the strength.

Strength alone is no longer accepted as a criterion of concrete quality. Durability tests accordingly were conducted on the 2- by 2- by 11¼-inch beams. The beams were fitted with a gage plug in each end so that any change in length could be measured with a dial comparator. Past experience has shown that an increase in length is a measure of deterioration of concrete especially in the freezing-and-thrawing test. Recent experiments at Kansas State College have shown a simultaneous reduction in the sonic modulus of elasticity with the increase in length.

Twelve beams were made from each cement. Three of these were used as moist-room control specimens; three were subjected to alternate freezing and thawing, three, to isothermal wetting and drying at 135 degrees F., and three were subjected to alternate heating and cooling in water. The sonic modulus of elasticity was determined, using an oscillator to vibrate the beams and a pick-up to determine when the beam was vibrating in the fundamental mode. From the dimensions and density of the beams and the resonant frequency of vibration the sonic modulus of elasticity was computed. Changes in the length and the frequency were measured on all twelve beams at regular intervals during the test. The results of these measurements were as follows:

The moist-room control specimens shrank an average of 0.0037 per cent. during the first week and then remained practically constant in length for over 21 weeks. There was no expansion; the smallest shrinkage was 0, and the largest shrinkage was 0.0075 per cent. During this time the sonic modulus of elasticity of these moist-room control specimens gradually increased. For example, at 18 weeks of age the maximum increase was 15 per cent., and the minimum increase was 11.5 per cent. The effect of the grinding aids on the length and the modulus of elasticity was practically nil for the moist-room control specimens.

The freezing-and-thawing tests produced the greatest effect of any of the tests. At 150 cycles the specimens containing beef tallow had expanded 0.13 per cent., and the modulus of elasticity had decreased 41 per cent. These specimens exhibited the least resistance to freezing and thawing.

Next in order came Nopco Plastol No. 1 with 0.08 per cent. expansion, and 32 per cent. reduction in modulus.

The powdered-aluminum specimens were next with 0.02 per cent. growth, and 16 per cent. reduction.

Cod oil came next with 0.005 per cent. expansion, and 9 per cent. reduction in modulus.

Specimens containing the other grinding aids showed practically no change in length (± 0.005 per cent.), and an average of 5 per cent. reduction in sonic modulus. At 400 cycles there was little change in these specimens.

Specimens containing Vinsol rosin were most resistant to freezing and thawing.

Isothermal wetting and drying was performed at the rate of one cycle per day at a uniform temperature of 135 degrees F. At 100 cycles all the specimens, except those containing powdered aluminum, had contracted about 0.02 per cent. The specimens containing powdered aluminum contracted only 0.005 per cent. The modulus of elasticity likewise showed little change except for the specimens containing powdered aluminum, which showed a decrease of 20 per cent. at 100 cycles. This test proved of little value as a durability test.

The heating-and-cooling test was conducted through a temperature range of from 60 to 140 degrees F. Twenty-four complete cycles were obtained each day. The specimens were submerged in water during the entire test, and the temperature of this water was raised and lowered gradually using steam and tap water. At 2,400 cycles the specimens containing the unsound cement had grown 0.025 per cent., with practically no change in the sonic modulus. The other specimens were grouped rather closely together as far as change in length was concerned, the range being from +0.005 per cent. for cements with cod oil and Nopco 1900 to +0.012 per cent. for the specimens containing powdered aluminum. The modulus of elasticity showed a somewhat greater spread. Specimens containing beef tallow and kojic acid showed an increase of 8 per cent. The Nopco products showed an increase of 7 per cent., Vinsol rosin and the blank 5 per cent., cod oil 2 per cent., and powdered aluminum 0 per cent.

One may conclude, within the limitation of these tests, as follows:

Vinsol rosin, cod oil, and beef tallow increased the efficiency in grinding.

Aluminum stearate increased the tensile strength.

Kojic acid, aluminum stearate, and cod oil increased the compressive strength.

Vinsol rosin increased the resistance to freezing and thawing.

Nopco Plastol No. 1, Nopco 1900, and cod oil increased the resistance to heating and cooling.

These tests, while limited in scope, show that none of the grinding aids tested was ideal for all conditions in service. It should be borne in mind that throughout the middle west there is a kind of concrete failure which involves gradual expansion beginning at an age of 2½ or more years. For example, a cross walk 11 feet long, across the street from the author's residence, has expanded over 6 inches in length during the last ten years.

The grinding and durability tests described above were all performed within a year. After three years the durability picture may be radically different from that shown here. It should be noted also that the above results may be radically different if another clinker were used.

[Note: This investigation was conducted by John H. Young, under the direction of the author, in partial fulfillment of the requirements for his Master's degree.]

Santa Cruz (*from page 56*)

The exit-gas temperature averages about 350 degrees F. The clinker leaves the new coolers at a temperature of less than 200 degrees.

A series of belt-conveyors distributes the clinker from these coolers into a 120,000-barrel covered storage. The clinker is reclaimed to the finish mill by means of the tunnel belt-conveyor system which was used for the old open clinker storage.

The foregoing improvements are the last important steps in the company's 10-year improvement program. This work was carried on under the direction of George R. Gay, vice-president and general manager, and R. A. Kinzie, consulting engineer. Much of the actual construction work was supervised by R. A. Kinzie, Jr., superintendent, with the assistance of R. Jennings, chief chemist, and Frank Languth, engineer.

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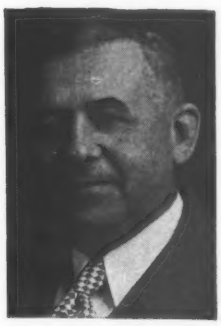

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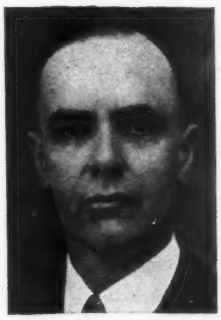

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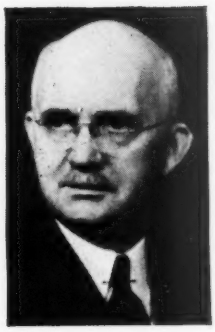

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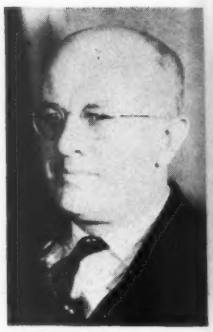

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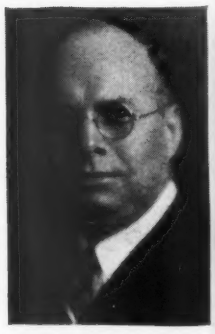

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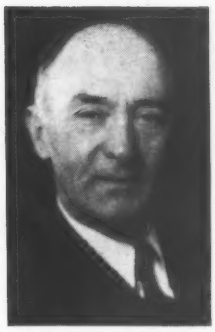

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Alkali-Aggregate Reactions on Concrete as Measured by Dynamic Modulus

By H. L. KENNEDY
Manager, Cement Division, Dewey & Almy Chemical Company

MUCH research in connection with the detrimental effects of alkali-aggregate[1] reactions has been undertaken as a result of the original findings and publications of T. E. Stanton, materials engineer for the Division of Highways of the State of California. Notable examples of concrete deterioration which may be due to the same cause have focused attention on this problem and inspired many concrete laboratories, particularly those of the Bureau of Reclamation in Denver, to plan and carry out extensive test programs in an effort to determine the fundamental reactions and to pave the way for practical correctives.

Much work yet remains to be done before definite answers can be given to the many pertinent questions being asked by concrete technicians. However, certain working theories, which aid materially in the prosecution of more fundamental investigations, have been evolved from the voluminous data obtained by many investigators to date, including T. E. Stanton, materials engineer, California Division of Highways; R. F. Blanks, senior engineer, U. S. Bureau of Reclamation; R. W. Carlson, professor of civil engineering, Massachusetts Institute of Technology; and F. R. McMillan, research director, Portland Cement Association. For example, it was formerly held that the actual expansion is a result of the crystallization of new compounds — not silicates — which are formed by the chemical reaction between the cement alkalies (potassia and soda) and some constituent of the reactive aggregate. However, when it was later established that silica was probably the only constituent of the aggregate which caused the expansion, this theory became untenable, since sodium and potassium silicates are liquids when they contain normal amounts of water.

A current theory, which appears to be more in accord with the known facts, considers the expansion to result from osmotic pressure. The cement paste which must surround each fragment of reactive aggregate is permeable to water and to alkalies in solution, but impermeable to the developed alkali-silicate gel. This gel requires more space than the aggregate constituent from which it is created. A pressure is thus produced around the aggregate fragments which results in their ultimate fracture, freeing some of the fluid silicate gel. The presence of an abundance of calcium hydroxide causes a gradual conversion of the fluid gel of sodium and potassium silicate to the rigid gel of calcium silicate, which is the hardening agent in ordinary concrete. Possibly the current theories will be modified or other theories will be evolved as more data are obtained.

Since concrete deterioration in the field has been characterized by excessive expansion, the measurement of length change has generally been adopted in laboratory investigations as the most practical criterion. Such laboratory investigations have shown that expansion occurs over an extended period of time, depending upon the nature of the aggregate. For a very active aggregate under accelerated conditions of test the expansion may continue from 50 to 150 days, at the end of which time expansion ceases. It has been customary to discontinue laboratory tests when the test specimens become quiescent. It is worthy of note, however, that in those cases where length-change measurements of such specimens have been continued subsequent contractions of slight amounts has often been found.

Concrete subject to alkali-aggregate reaction is also characterized by its dead, chalky nature. This had led some investigators to employ the modulus of elasticity of such concrete as a measure of its condition and for this purpose the sonic method of determining Young's modulus was found admirably suited. The modulus of elasticity as determined by the sonic method (referred to simply as "dynamic modulus" in this paper) has been the principal test used by the cement and concrete laboratory of the Dewey & Almy Chemical Company. It is hoped that the results reported, which supplement rather than duplicate existing data, will contribute to the ultimate solution of the alkali-aggregate problem.

In general, the results available to date indicate good correlation between length-change and dynamic-modulus measurements to the point of maximum expansion. After maximum expansion is reached length-change measurements show little or no further change. Hence, dynamic modulus provides the only available index of the changing conditions of the concrete after the maximum deterioration is obtained. The tests of dynamic modulus were started in this laboratory more than two years ago so that the results to date go far beyond the stage of maximum expansion for a very reactive aggregate. Some results through 700 days are being reported in part in this paper.

Procedure Specimens of pebble concrete 1½ by 1½ by 6 inches were made, incorporating two active aggregates in combination with high- and low-alkali cements and several sound basic aggregates. The two active aggregates were:

1. Highly active siliceous magnesian limestone, which has given much trouble in southern California and contains, according to T. E. Stanton, approximately 20 per cent. opal, which all available evidence points to as the detrimental constituent. This aggregate will hereinafter be designated as "Stanton" aggregate.

2. Phyllite, a near-slate of relative low activity, which has been reported by Kammer and Carlson as being responsible for 0.5 per cent. expansion of the Buck hydroelectric plant 30 years after completion, when making up 100 per cent. of coarse aggregate.

Eight Portland cements, mostly of the Type II variety and ranging in alkali content from 0.48 to 1.20 per cent., were employed. In some cases

[1]Throughout this paper the name "alkali" refers to the Na_2O and K_2O present in the Portland cement or Portland cement replacements.

25 per cent. replacements of the Portland cement by a slag cement, having in itself an alkali content of 1.6 per cent. were made.

The basic aggregates principally used for controls were Scituate sand and gravel (a well-graded, washed, glacial material composed of slate, quartz, granite and other constituents), and Long Island sand and gravel (largely quartz). Both these aggregates have good service records in concrete. Also included as basic aggregates in a few exploratory tests were quartzite obtained from a North Carolina deposit and Ottawa silica sand.

Mixes of 1:2, 1:2.5 and 1:5 by weight were tried with water-cement ratios of 0.40 and 0.60 by volume. The maximum aggregate size in the pebble concrete was ⅜ inch, all the basic aggregates being graded to give minimum particle interference. All the replacements of a basic aggregate by reactive aggregates were made in the 14- to 48-mesh sizes.

Most specimens were standard-cured in the molds for 24 hours and then placed in sealed containers on wire screens about ½ inch above a layer of water, but some duplicate specimens were standard-cured for 3 and 7 days before being stored in the sealed containers. These containers were then stored in constant-temperature boxes at 110 degrees F. Some specimens were stored at 70 degrees F. in the presence of excess moisture for comparison. The specimens were generally tested for the first time at the age of 7 days regardless of the preliminary curing conditions. All the results reported are averages of at least two specimens per condition of test.

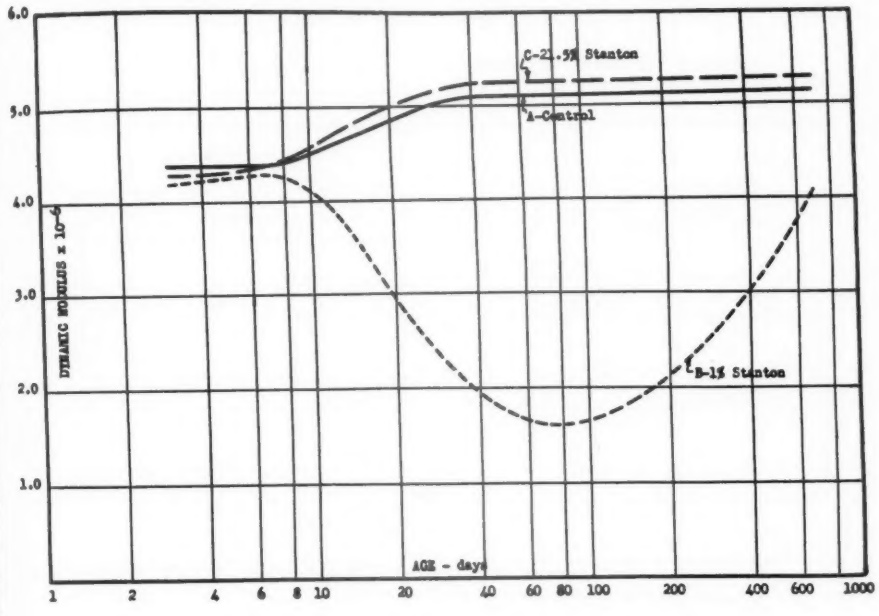


Figure 1.—Effect of Stanton replacement of Long Island aggregate.

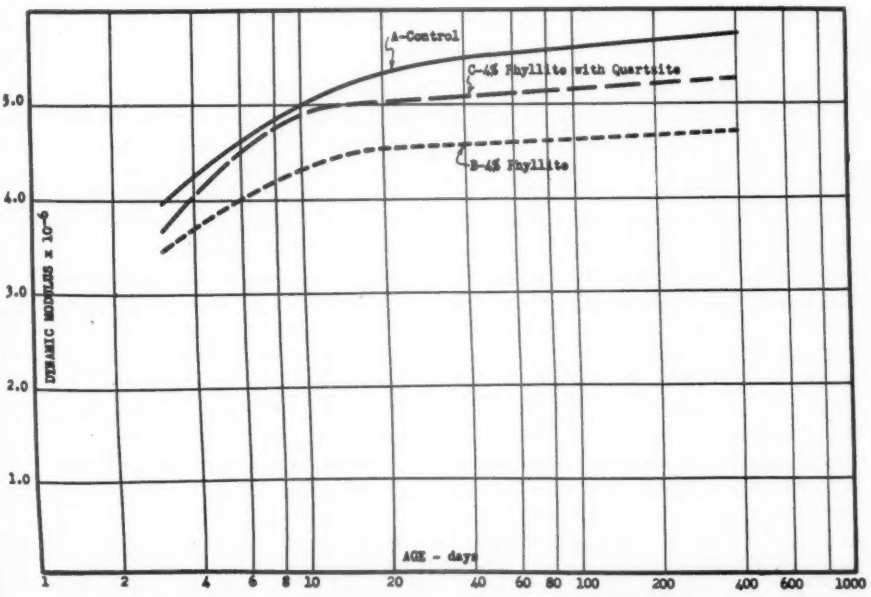


Figure 2.—Phyllite and Stanton replacements of Scituate aggregate and quartzite.

Change in Dynamic Modulus Figure 1 is typical of the many dynamic-modulus curves obtained on concrete specimens which were preliminary-cured for 24 hours in the molds and then stored in sealed containers at 10 degrees F. As shown in Table I, these specimens contained high-alkali cement and various percentages of Stanton aggregate substituted in the 14- to 48-mesh range of either Scituate or Long Island aggregate. It will be noted that the modulus of the control specimens was over 5,000,000 p. s. i., whereas the modulus of the concrete containing 1 per cent. Stanton aggregate as a replacement was only 1,600,000 p. s. i. at 75 days, a reduction of 75 per cent. Similar effects were obtained with the other basic aggregates at mixes ranging from 1:2 to 1:5 although in some cases the maximum decrease was delayed until 150 days of storage at 110 degrees F.

The work done by the investigators previously cited has already directed attention to the fact that there appears to be a critical range of percentage of reactive aggregate required to produce alkali-aggregate reactions and expansion. Too much reactive aggregate appears to be as effective as too little in eliminating or minimizing the expansion effects of such reactions. The critical range seems to depend upon the richness of the mix, the length of the preliminary curing, the types of the cement and basic aggregate as well as the type and fineness of the reactive aggregate, and other factors not all at present known. It is therefore interesting to note in Figure 1 that dynamic modulus responds similarly, and that the replacement of all the 14- to 48-mesh sizes with Stanton aggregate—in this case 21.5 per cent. of the total aggregate—completely eliminated all the detrimental effect as measured by dynamic modulus. This is in direct contrast to the results obtained with a 1 per cent. replacement of Stanton aggregate in the 14- to 48-mesh sizes.

Still more interesting is the fact that after 75 days, the dynamic modulus of the 1 per cent. specimens improves rapidly, until at 700 days it has reached more than 4,000,000 p. s. i. The same is true of the 1 per cent. and the 5 per cent. specimens shown in Figures 3 to 6, except

that the minimum in modulus is not always obtained at 75 days and the percentage of modulus recovery is frequently greater than that shown in Figure 1. It is worthy of note that a relation seems to exist between the recovery of dynamic modulus and the rate of decreased and subsequent increased expansion. It is indicated that the modulus of these expanded specimens will in time reach that of the control specimens.

Although, as already noted in the foregoing, good agreement exists between the length change and the dynamic modulus in the early stages of curing, the correlation between these two criteria is poor after the specimen becomes quiescent and no further increase in length is noted. A slight contraction has been noted by some of the investigators who have measured length change during this period, but the amount of this contraction is relatively small compared with the recovery in dynamic modulus, and, as a matter of fact, the amount of the contraction is so small as to be questionable.

Hence, despite the fact that there is an apparent recovery in the soundness of the specimen as indicated by the recovery in dynamic modulus, the fact yet remains that the density of the specimen has been decreased through the residual expansion which occurred during the reactive period. It would be bold indeed to predict that the recovery in dynamic modulus to approach that of the control specimen indicates full recovery of all the properties of the concrete. Yet the recovery in dynamic modulus seems to indicate that the concrete has improved to some extent and is in much better condition after recovery than at the point of maximum expansion.

This recovery of dynamic modulus could be attributed to autogenous healing due to the development of the more stable solid calcium silicate, which has partially replaced the fluid silicates of sodium and potassium. Some of the cracks in the expanded specimens are seen to have filled up during the period following maximum expansion. Obviously the increase in effective cross-sectional area resulting from the sealing of these cracks must contribute to the recovery in dynamic modulus during the healing period. At the same time, the appearance of the uncracked concrete in these specimens is considerably improved as the modulus recovers, indicating that the recovery of modulus must also be due to a general improvement of the concrete itself. Much work will have to be done to properly evaluate this apparent autogenous healing.

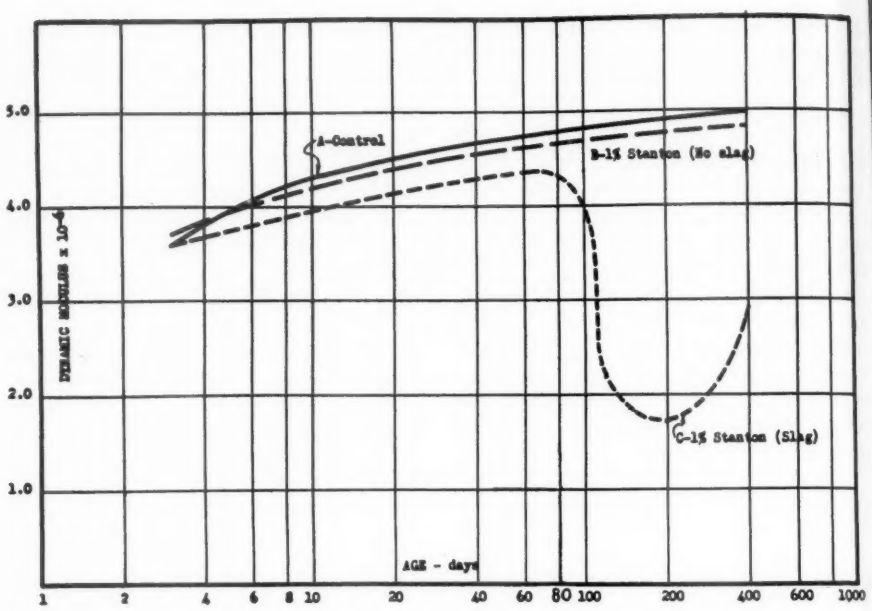


Figure 3.—Stanton replacements with slag and low-alkali cement.

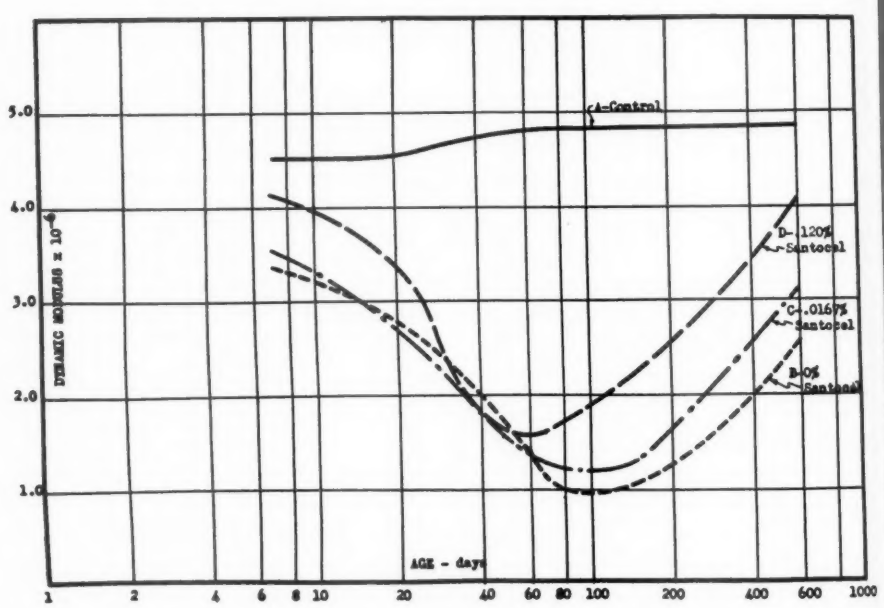


Figure 4.—Effect of silica gel with l. per cent. Stanton replacements.

Most of the long-term dynamic-modulus data were obtained on specimens which had been cured in the molds for 24 hours and then immediately placed in the sealed containers at 110 degrees F. A more recent series, now approximately 180 days old, is under way. For these the specimens were cured 24 hours in the molds and 6 days in a fog room before being placed in the sealed containers, other conditions being identical. It is worthy of note that the limited data thus far available indicate that the amount of preliminary curing has a marked effect on the alkali-aggregate reaction. For example, in the first series a marked decrease in dynamic modulus was obtained with the use of 1 per cent. Stanton aggregate and a high-alkali cement, the preliminary curing of the specimens being only 24 hours. However, a 1 per cent. substitution of Stanton aggregate under the later conditions of curing has so far (180 days) caused no decrease in the dynamic modulus. On the other hand, a 5 per cent. substitution of Stanton aggregate with 7 days of preliminary curing is now showing a decided loss in the dynamic modulus in contrast to the earlier results on specimens preliminary cured 3 days, where no loss was encountered up to 700 days.

Buck Dam Phyllite Figure 2 shows the results obtained with a high-alkali cement when 4 per cent. phyllite was substituted in the 14- to 48-mesh sizes of Scituate aggregate. The high-alkali cement used consisted of 77.5 per cent. Portland cement containing .2 per cent. alkali and 22.5 slag cement containing 1.6 per cent. alkali, the average alkali content of the blend being 1.3 per cent. No drop in the dynamic-modulus curve was found but a slight overall lowering of the modulus from that of the Scituate control specimens was evident. A 4 per cent. substitution of phyllite in the 14- to 48-mesh sizes of quartzite also was tried, as shown in Figure 2. However, no drop in the modulus curve was found with this combination, although slightly greater overall values of the modulus were obtained relative to those for the Scituate-phyllite combination.

It must be borne in mind that many years were required before serious expansion was obtained in the Buck hydroelectric plant. Hence, phyllite, if reactive, must be considered as very slow-acting, with the result that no decrease in dynamic modulus of the phyllite specimens should be expected for several years. Also phyllite was used for 100 per cent. of the aggregate on the Buck project, whereas only 4 and 5 per cent. of the aggregate on the Buck laboratory tests were cited. It is very probable, therefore, that considerably less than the critical percentage was used in the laboratory tests.

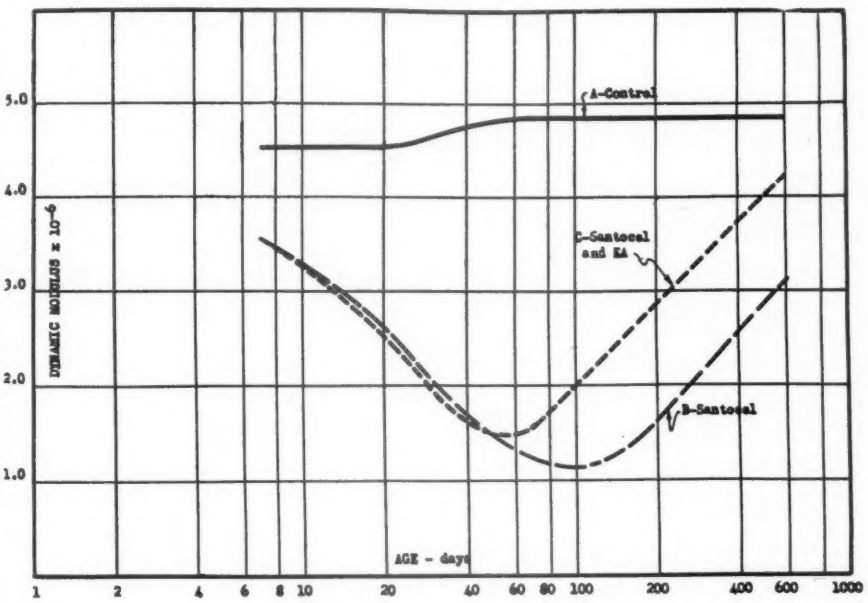


Figure 5.—Effect of triethanolamine with 1 per cent. Stanton replacements.

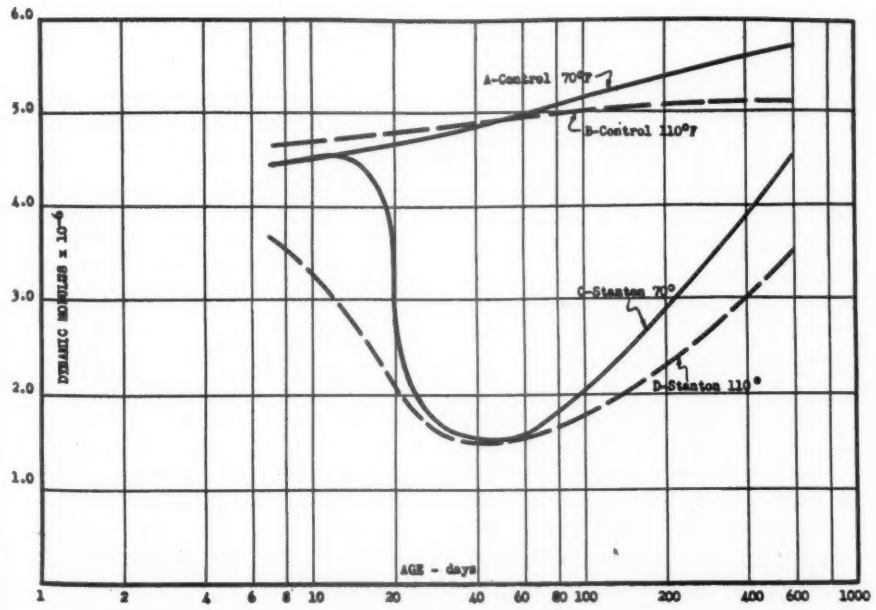


Figure 6.—Effect of storage temperature with 1 per cent. Stanton replacements.

Cement Replacements Containing Alkali Figure 3 shows the results obtained with a 1 per cent. Stanton aggregate substitution in conjunction with a Portland cement containing only 0.48 per cent. alkali. Curves A and B are practically identical, any slight variations being within the limits of experimental error. This is in sharp contrast to the results obtained with a 1 per cent. Stanton replacement in conjunction with a high-alkali Portland cement, which combination has always shown a sharp break in the dynamic-modulus curve regardless of the type of basic-aggregate used in these studies.

In the same series 25 per cent. of the low-alkali Portland cement was replaced by a slag cement containing approximately 1.6 alkali (Na_2O—K_2O), the average alkali content of the blend being 0.76 per cent. That this addition of an alkali-bearing material caused an alkali-aggregate reaction to occur is shown by the drop in the dynamic modulus for curve C of Figure 3. It may be significant, however, that the minimum modulus was appreciably delayed, occurring at 200 days instead of the usual 75 days. The data suggest that the addition of alkali in any form in conjunction with a reactive aggregate will cause excessive expansion and a loss in the modulus of elasticity and indicates the danger of adding any alkali-bearing material to concrete when reactive aggregate is known to be present.

Effect of Adding Silica Gel to Concrete It was early reported by Stanton that pulverization of the reactive aggregate to an impalpable powder eliminated the expansion attributable to the alkali-aggregate reactions.[2] It has been suggested that this is due to the much greater reactivity of the siliceous material, causing completion of the alkali-aggregate reactions at a very early period, perhaps even before the final set is obtained. In any event, it is obvious that if the alkali reactions can be completed at an early age, the effects of these reactions will be partially or completely eliminated as measured either by expansion or dynamic modulus.

[2] *California Experience with the Expansion of Concrete through Reaction between Cement and Aggregate*, T. E. Stanton, O. J. Porter, L. C. Meder and Allen Nicol; *Proceedings*, American Concrete Institute, vol. xxxviii, 1942, p. 209.

Table I.—STORAGE AND MIX DATA FOR FIGURES 1 TO 6.

Figure	Reference	Cement	Aggregate	Mix	W/c Ratio	Storage Temperature	Standard Curing
1	A-Control	High-alkali Portland, 1.2% total alkali	100% Long Island	1:5	.60	110° F.	24 hr.
1	B-1% Stanton	High-alkali Portland, 1.2% total alkali	98.96% Long Island; 0.59% Stanton in 14-28; 0.45% Stanton in 28-48	1:5	.60	110° F.	24 hr.
1	C-21.5% Stanton	High-alkali Portland, 1.2% total alkali	78.5% Long Island; 100% Stanton replacement in 14-28; 100% Stanton replacement in 28-48; or 21.5 total Stanton replacement	1:5	.60	110° F.	24 hr.
2	A-Control	77.5% High-alkali Portland, 22.5% slag	100% Scituate	1:2	.40	110° F.	3 days
2	B-4% Phyllite	77.5% High-alkali Portland, 22.5% slag	96% Scituate; 4% Phyllite 2% of total mix in 14-28 2% of total mix in 28-48	1:2	.40	110° F.	3 days
2	C-4% Phyllite and Quartsite	77.5% High-alkali Portland, 22.5% slag	96% Quartsite; 4% Phyllite 2% of total mix in 14-28 2% of total mix in 28-48	1:2	.40	110° F.	3 days
3	A-Control	75% low-alkali Portland, 25% slag	100% Scituate	1:2	.40	110° F.	3 days
3	B-1% Stanton	75% low-alkali Portland, 25% slag	98.9% Scitutate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2	.40	110° F.	3 days
3	C-1% Stanton Phyllite	100% low-alkali Portland	98.96% Scituate; .59% Phyllite in 14-28; .45% Phyllite in 28-48	1:2	.40	110° F.	3 days
4	A-Control	High-alkali Portland, total alkali 1.2%	100% Scituate	1:2.5	.40	110° F.	24 hr.
4	B-0% Santocel	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	110° F.	24 hr.
4	C-.0167% Santocel, dry blend	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	110° F.	24 hr.
4	D-.120% Santocel, dry blend	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	110° F.	24 hr.
5	A-Control	High-alkali Portland, total alkali 1.2%	100% Scituate	1:2.5	.40	110° F.	24 hr.
5	B-.0167% Santocel, dry blend	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	110° F.	24 hr.
5	C-.033% Santocel, .014% Triethanolamine, dry blend	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	110° F.	24 hr.
6	A-Control 70° F.	High-alkali Portland, total alkali 1.2%	100% Scituate	1:2.5	.40	70° F.	24 hr.
6	B-Control 110° F.	High-alkali Portland, total alkali 1.2%	100% Scituate	1:2.5	.40	110° F.	24 hr.
6	C-Stanton 70° F.	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	70° F.	24 hr.
6	D-Stanton 110° F.	High-alkali Portland, total alkali 1.2%	98.96% Scituate; .59% Stanton in 14-28; .45% Stanton in 28-48	1:2.5	.40	110° F.	24 hr.

Hence, the speed of the alkali-aggregate reaction is apparently of great importance.

If the foregoing hypotheses can be accepted as correct, it seemed possible to eliminate the detrimental effects of alkali-aggregate reactions by incorporating in concrete during the mixing operation or as an ingredient of the cement, the right percentage of a highly active siliceous material, *e.g.*, Santocel, a silica gel. Since Santocel has a surface area of 6,000,000 square centimeters per gram, it is obvious that .25 to .033 per cent. addition of Santocel by weight of cement, will equal in surface area an average fine Portland cement. The results obtained with a 1 per cent. Stanton substitution and the addition of .0167 to .120 per cent. of Santocel (silica gel) by weight of the Portland cement are shown in Figure 4, the cement in question being the high-alkali blend used in previous tests (alkali content 1.20 per cent.). It will be noted that increasing percentages of silica gel appear to accelerate the reaction slightly and also to decrease the amount of the modulus loss somewhat.

The effects obtained by the addition of silica gel in the amounts tried are insufficient in magnitude to have any practical value. However, it is not conclusively demonstrated that results of practical value are impossible of attainment since significant trends are indicated by these data. The amounts of silica gel used were very small, perhaps much too small to use up sufficient quantities of the cement alkali; the desirability of making tests with larger quantities of silica gel or an equivalent material is definitely indicated. It is worthy of note that the addition of silica gel appears to increase the amount of modulus recovery, the amount of recovery being roughly proportional to the amount of silica gel added.

Effect of Adding Triethanolamine with Silica Gel As noted above, silica gel was used as an addition agent in order to promote chemical combination of the cement alkali with the highly active silica of the gel. In other words, the reaction was speeded up by introducing a silica which was considerably more active than the siliceous constituent of the aggregate. It was also believed that chemical combination could be promoted by increasing the solubility of the cement alkali. Since triethanolamine has been shown to increase the solubility of the alkali in Portland cement paste,[3] a series of tests were conducted to observe the rate as well as the total loss in dynamic modulus and to observe its recovery.

The results obtained with the addition of .014 per cent. triethanolamine by weight of the Portland cement are shown in Figure 5, the cement being the high-alkali blend used in previous tests (alkali content 1.2 per cent.). It will be noted that the specimens containing the Santocel alone dropped to a low of 1,115,000 at 100 days. At the end of 600 days the dynamic modulus has recovered to a high of 3,100,000. When the triethanolamine was present, the maximum expansion or the maximum loss in dynamic modulus occurred at 50 days, in contrast to the 150 days required for the specimens without triethanolamine. Furthermore, the dynamic modulus was reduced to only 1,500,000. At 600 days the specimens containing the triethanolamine had recovered to approximately 4,200,000.

Comparing Figure 4 and Figure 5, it will be seen that .014 per cent. of triethanolamine was as effective as 0.1 per cent. Santocel in minimizing the modulus loss resulting from the alkali-aggregate reactions. It is indicated that the combination of a suitable amount and type of accelerator with the proper amount of a highly active siliceous material may provide a corrective.

Effect of Curing Temperatures It has been observed by other laboratories that, according to expansion measurements, the alkali-aggregate reaction is accelerated by storing the specimens at moderately elevated temperatures, *e.g.*, 100 to 130 degrees F. In the case of the Buck

[3]Kalousek (G. L.), Jumper (C. H.) and Tregoning (J. J.) *Journal of Research*, National Bureau of Standards, 30, p. 215. (1943) R. p. 1530.

phyllite it has been found by Carlson that only with such temperatures can measurable expansion be obtained within reasonable test periods.

Similarly, the alkali-aggregate reaction as indicated by dynamic modulus is accelerated by storage at elevated temperatures, as shown in Figure 6. In this case 1 per cent. of Stanton aggregate in combination with 99 per cent. Scituate aggregate was used in conjunction with a cement having an alkali content of 1.20 per cent. At 110 degrees F. the effect of the reactive aggregate makes itself felt at 7 days when the first reading was taken, while at 70 degrees F. 20 days' time was required to produce the same decrease in modulus. The maximum decrease in dynamic modulus is seen to occur at the same age for both.

Recapitulation It has been found that good agreement exists between length-change and dynamic-modulus measurements until the maximum expansion is obtained, but subsequent to the maximum expansion there is a recovery in certain physical properties of the concrete indicated by dynamic-modulus measurements which is not reflected by length-change measurements. It is indicated that complete recovery of the dynamic modulus can be expected in time.

It is also shown that the speed of the alkali-aggregate reaction and the amount of the subsequent modulus recovery can be increased: (1) by adding suitable amounts of a highly active siliceous material, and (2) by increasing the solubility of the cement alkali through the use of an addition agent such as triethanolamine. This suggests the possibility that the detrimental effects of the alkali-aggregate reaction can be eliminated by the use of an addition agent containing highly active silica and a material for increasing the solubility of cement alkali. Much more work with silica gel, triethanolamine or equivalents should be done.

Table II.—DYNAMIC-MODULUS DATA FOR FIGURES 1 TO 6.

Figure 1 — Age (days)

Reference	3	7	35	41	56	63	70	77	84	98	105	121	154	161	204	303	400	500	600	700
A-Control	4.40	4.40	5.10	4.95	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	4.95	4.95	5.28	5.28	5.12	5.12	5.15	5.15
B-1% Stanton	4.20	4.30	2.08	1.84	1.76	1.69	1.63	1.60	1.64	1.71	1.86	1.84	1.59	2.31	2.08	2.41	3.03	3.55	3.86	4.04
C-21.5% Stanton	4.30	4.40	5.28	4.95	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.62	5.62	5.44	5.44	5.60	5.29

Figure 2 — Age (days)

Reference	3	10	20	30	41	62	90	120	150	200	300	400
A-Control	3.97	5.07	5.20	5.38	5.52	5.52	5.52	5.52	5.71	5.87	5.71	5.71
B-4% Phyllite	3.44	4.34	4.23	4.56	4.56	4.56	4.67	4.67	4.67	4.67	5.06	4.67
C-4% Phyllite Quartzite	3.65	4.97	5.02	5.02	5.02	5.02	5.35	5.02	5.18	5.02	5.39	5.18

Figure 3 — Age (days)

Reference	3	10	18	31	45	60	75	90	105	120	150	200	300	400
A-Control	3.59	4.35	4.35	4.58	4.67	4.69	4.80	4.69	4.81	4.69	4.81	4.81	5.38	4.95
B-1% Stanton	3.66	4.15	4.07	4.23	4.23	4.35	4.35	4.08	3.80	2.06	1.87	1.70	2.37	2.68
C-1% Stanton	3.70	4.26	4.26	4.53	4.53	4.52	4.64	4.54	4.63	4.63	4.63	4.74	4.81	4.81

Figure 4 — Age (days)

Reference	7	21	28	35	42	49	53	75	94	150	230	300	400	500	600
A-Control	4.53	4.53	4.64	4.85	4.85	4.74	4.74	4.85	4.85	5.13	4.85	4.85	4.85	4.85	4.85
B-0% Santocel	3.37	2.80	2.47	2.13	2.18	1.54	1.59	1.02	.96	1.02	1.40	2.06	2.11	2.16	2.56
C-.0167% Santocel	3.55	2.64	2.15	2.17	1.62	1.75	1.48	1.20	1.20	1.30	1.80	2.20	2.59	2.84	3.10
D-.120% Santocel	4.14	4.34	2.53	1.86	1.84	1.47	1.51	1.86	1.75	2.10	2.84	3.10	3.43	3.95	3.95

Figure 5 — Age (days)

Reference	7	21	28	35	42	49	53	75	94	150	230	300	400	500	600
A-Control	4.53	4.50	4.64	4.85	4.85	4.74	4.74	4.85	4.85	5.14	4.85	4.85	4.85	4.85	4.85
B-.0167% Santocel	3.55	2.64	2.15	2.17	1.62	1.75	1.48	1.20	1.20	1.30	1.80	2.20	2.59	2.84	3.10
C-.033% Santocel and .014% Triethanolamine	3.55	2.72	1.58	1.74	1.78	1.56	1.48	1.66	2.07	2.34	3.25	3.42	3.75	4.13	4.13

Figure 6 — Age (days)

Reference	7	14	21	28	35	49	68	99	150	192	280	378	500	600
A-Control 70	4.42	4.64	4.64	4.64	4.85	4.85	5.13	5.43	5.43	5.13	5.29	5.78	5.78	5.80
B-Control 110	4.64	4.64	4.75	4.85	4.85	4.85	4.85	5.13	5.13	4.85	5.01	5.27	4.96	5.22
C-Stanton 70	4.42	4.64	2.22	1.63	1.63	1.55	1.67	1.90	2.75	3.20	3.36	3.77	4.20	4.55
D-Stanton 110	3.68	2.81	1.97	1.53	1.74	1.78	1.53	1.80	2.06	2.31	2.64	2.88	3.37	3.56

Approve Simplification of Wire-Rope Standards

A Simplified Practice Recommendation for wire-rope has been approved for promulgation, according to an announcement by the Division of Simplified Practice National Bureau of Standards. It went into effect February 15, 1943 and will be identified as "R198-43."

The program, which lists sizes, constructions, grades and breaking strengths of the vast majority of tonnage of wire rope, was developed by engineers of the wire-rope industry to serve as a war-time conservation measure and as a guide for post-war practice.

It is concerned primarily with items that are produced for stock purposes, and does not attempt to deal individually with the numerous and particular end uses to which wire ropes are put. These special-purpose ropes will be furnished by the manufacturers only when their necessity has been demonstrated. The producers of wire-rope will view this necessity in the light of the war-production program.

This simplification program, the result of long study by the industry, was passed through the regular procedure of the National Bureau of Standards at the request of the War Production Board. General adherence to the recommendation will result in a net reduction in variety from 973 items to 643, or 33.9 per cent. The major production and use of wire-rope and, therefore, the predominant tonnage, is covered by four different rope constructions, where the reduction in variety will be from 352 items to 182, or 48 per cent.

Pending the printing of R198-43, information concerning this recommendation may be obtained upon request from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

Recent Improvements Make Permanente Cement Plant World's Largest

MANY changes have been made in the plant of the Permanente Cement Corporation since the first complete description of it was published in the December, 1940, issue of PIT AND QUARRY. Since then a fourth 465-foot rotary kiln has been added, making this undoubtedly the largest plant in existence. Other improvements included the opening of a second quarry with an extensive conveyor system, enlargement of the crushing and raw- and finish-grinding departments, the installation of a third slurry thickener and slurry filters, etc. This plant produced approximately 6,000,000 barrels of cement in 1942.

The original quarry has been developed steadily and remains the chief source of raw material for the plant. Extensive exploratory work has been done and it is estimated that there is enough 90- to 95-per cent. $CaCO_3$ material in sight to operate the plant for at least six years without requiring the use of the flotation system. The geology of this formation is such that suitable rock is found at lower levels and tests indicate at least another six years' supply without the use of flotation and a limitless supply which can be made usable through flotation.

Few changes have been made in the original quarry and substantially the same methods and equipment described in the earlier article remain in use.

Late in 1941 a second quarry was opened at a lower level to supply 96-per cent. plus limestone for sugar-rock production without interfering with the cement-rock production from the original quarry. Formerly the minus-2½-inch fines incidental to sugar-rock production were used for cement manufacture and the wide variations in the demand for sugar-rock made it difficult to hold the proper blend of raw materials for cement. In the new quarry is found some low-grade rock which must be removed and is used for cement or for crushed-stone production in order to expose more sugar rock. The production of crushed stone has averaged about 1,000 tons daily. This quarry also serves as a reserve source of supply in case the main quarry should be inoperative for some reason. It yields about 50 per cent of 2½- to 5-inch sugar rock compared to less than 25 per cent. from the main quarry.

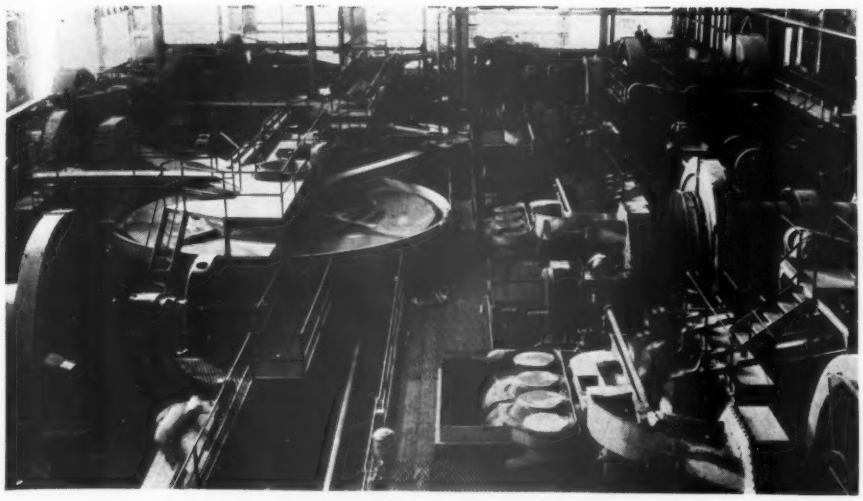
Rock is conveyed to the plant on what is probably one of the longest single belt-conveyor flights in existence. This 48-inch by 4,000-foot conveyor has a capacity of 1,700 tons per hour. In order to make this possible the conveyor goes through two tunnels en route to the plant. These are 200 and 300 feet long, respectively.

A 5- by 12-foot Allis-Chalmers vibrating screen receives the rock from this conveyor and divides it into sugar and cement rock with the oversize going to a Telsmith Type B crusher. This equipment operates independently of that handling the rock from the main quarry but the products go to the same stock-piling conveyors.

Part of the 4,000-foot belt-conveyor.

A general view of the Permanente plant. Thickener tanks in foreground.

Originally all the clay required was obtained in cleaning up and landscaping the property about the plant but it later became necessary to open a clay pit near the main quarry. This pit is estimated to contain a 15 years' supply. The clay is first loosened by a ripper, and an RD8 Caterpillar tractor with a 10-



General view in raw mill showing grinding mills and bowl classifiers.

cubic yard Carryall scraper hauls it to a hopper. A grizzly removes the oversize lumps and a pan-feeder discharges the clay on belt-conveyor B of the main conveyor system running to the plant. The clay bypasses the screens at the end of this conveyor system. When clay is being handled, stone can be conveyed simultaneously from the new quarry but not from the main one.

A new boom belt-conveyor discharges this clay on a hillside stock pile which is near the plant and has a live-storage capacity of about 20,000 tons. Drag-scrapers feed the clay to a hopper over a belt-conveyor running to a new Pennsylvania Impactor reversible hammer-mill. The product of this crusher now goes to a 9½- by 10-foot Traylor ball-mill

Some of the rotary pumps which supply filter vacuum.

with a Dorr sand-wheel which is in closed circuit with a Bird centrifuge. The centrifuge was installed to increase the fineness to which the clay could be ground. Since its installation no plus-100-mesh material has been obtained. If desired the centrifuge can be by-passed. In either case the product goes to three Tyler Hum-mer screens with 14-mesh cloth from which the oversize goes to a 7- by 26-foot Traylor 2-compartment mill. The material falling through the screens goes to a 7- by 26-foot Smidth tube-mill. The product of both mills is 90 per cent. through 200-mesh clay slip and is transferred by a Wilfley pump into blending tanks. When the centrifuge is by-passed the clay must be run through these mills twice in order to obtain the desired fineness.

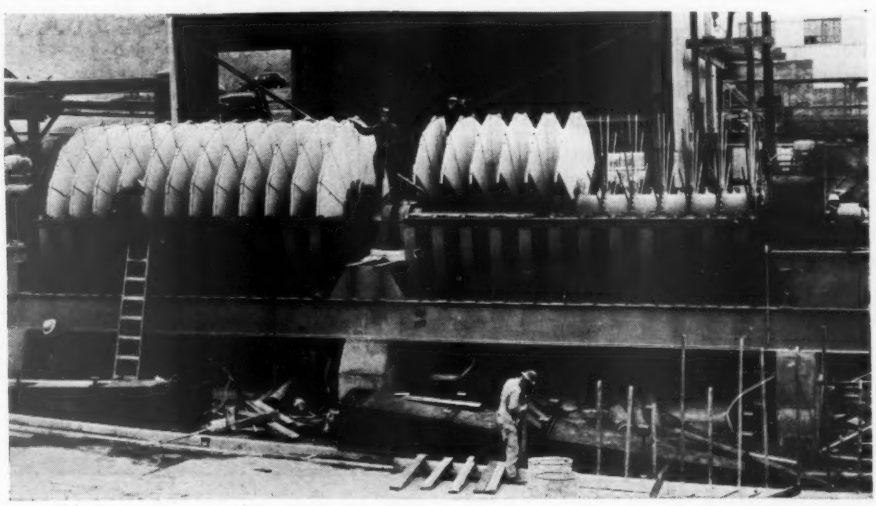
In the raw-material-grinding department there are now three primary grinding mills to which rock is supplied by Merrick Feedoweights. These 9½- by 10-foot Allis-Chalmers, F. L. Smidth, and Traylor ball-mills are each in closed circuit with Dorr Multi-zone classifiers. Wilfley pumps feed this material into four 9½- by 10-foot secondary-grinding mills which are in closed circuit with Dorr bowl classifiers. The slurry from this department is pumped to the thickeners. When the last kiln was installed, a 125-foot-diameter Dorr thickener was added to supplement the two original 150-foot thickeners.

The underflow of the thickeners has a solid content of from 55 to 65 per cent., depending on the type of rock being processed, the load, the pH content of the water, etc. Each of the thickeners is operated independently and all are operated or shut down as the demand requires. Usually from 25 to 30 per cent. of the slurry is fed to the three 12½-foot diameter, 12-disk Oliver American continuous filters. Two of the filters operate as a pair and the third one operates singly, making it possible to use any desired part of the filter capacity at any time. The vacuum for each of the pair of filters is supplied by dual Fuller rotary vacuum pumps comprising V200 and V300 machines. This is said to be the first time rotary pumps have been used on filters in this field and they are doing the work satisfactorily. An Ingersoll-Rand 22- by 10-inch, 2-cylinder pump creates the vacuum for the single filter.

The filter cake is discharged from the pair of filters into one and from the single filter into the other of two Dorr turbo-mixers, which blend it in with the remainder of the slurry. A 5-inch Wilfley pump moves this slurry to the blending tanks and has handled slurry containing up to 70 per cent. solids without difficulty.

The four 450- and 465-foot rotary kilns are now equipped with burners of original design which can be switched in 1½ minutes from gas to oil as fuel. The gas comes from the company's magnesium plant.

The capacity of the finish-grinding department was also increased by the installation of new equipment. Included was a new mill unit consisting of a preliminator and an 8- by 36-foot finish mill, two 16-foot separators, Fuller-Kinyon pumps, Fuller rotary compressors, Merrick Feedoweights, etc.



Two of the 12-disk filters being assembled.

By E. B. SMITH
Chief Engineer, Dewey Portland Cement Company

New System Recovers High Percentage of Dust at Dewey's Davenport Plant

another ON THE SPOT report

ONE of the major sources of dust around any cement plant is the kiln stack. This dust is in large volume and of high fineness, and is difficult to handle mainly because of its high temperature.

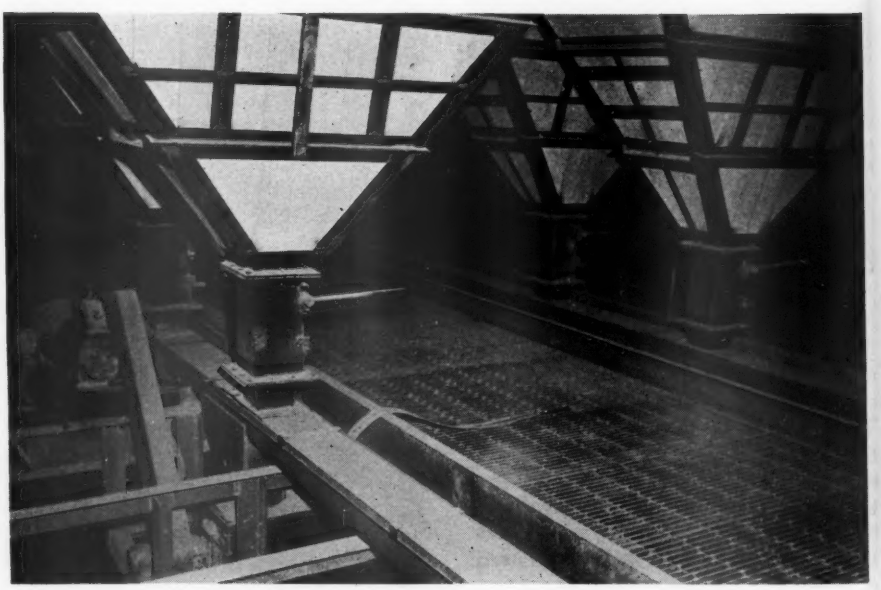
At the Davenport, Iowa, plant of the Dewey Portland Cement Company the first dust-loading tests were made in 1931, measurements on stack gases from the three 11- by 175-foot rotary kilns showing 307,000 c.f.m. at 612 degrees F. However, due to various conditions arising at that time, the installation never got beyond the blueprint stage. The problem was brought back to the active status in 1940, when the tests showed 299,000 c.f.m. at 650 degrees F. Final plans were made and equipment was purchased in 1940, but the installation was not completed and put into service until April, 1942.

The collecting system consists of thirty-six Number 10½ AC (AC130) Buell cyclones (Van Tongeren System) arranged for parallel operation in three groups of twelve each, the gas being handled from the stack flue through the collectors by three paddle-wheel type fans, driven by 100-horsepower motors, which exhaust back to the 15- by 200-foot concrete stack. The dust from the collectors is discharged into three 6-inch screw-conveyors, thence to a central 9-inch screw-conveyor which discharges it into a 12-inch bucket-elevator. This elevator also handles all the dust from the kiln house, flues and boilers. The elevator discharges into a distributor which is of original design and distributes the dust equally to the feed spouts of the kilns, the whole system being a continuous 24-hour operation. It is important to distribute the dust back into the kilns continuously as it is collected in order to maintain a uniform chemical balance. The collectors, conveyors, etc., are housed in a steel-and-stucco building with a precast-slab roof. All the screw-conveyors were supplied by the Screw Conveyor Corporation and are driven through D. O. James reducers and chains.

Outside the collector bank the layout, design, and construction of the remainder of the equipment were done by the engineering department of the Dewey Portland Cement Company. The general layout of the ducts, collector fans, stack, screw-conveyors, elevators, distributor, and distributing system are shown in the accompanying pictures.

The distributor is of original design. It consists of a vertical cylindrical chamber with a flat bottom in which are two discharge openings for each of the three kilns. These are arranged counterclockwise as follows: 1, 2, 3, 2, 1, 3. The dust enters this chamber through a goose-necked revolving spout which also moves counter-clockwise a few inches above these openings. The size of the holes, their spacing, and the speed of the revolving spout are all arranged so that the spout will discharge its entire accumulated con-

The dust-collector building with kiln stack at right.



View showing manner in which the three 6-inch screws feed dust to central main screw. Speed reducer and chain drive of main screw at left.

tent at each hole. Any discharge between holes is prevented by the layer of dust which accumulates and acts as a continuous seal. When it is desired to shut off the feed to any kiln, the gates in the two discharge spouts to that kiln are closed and the arrangement of the holes divides the dust equally between the two remaining kilns. If the feed of two kilns is shut off, all the dust goes to the third kiln. The spouts feed individual screw-conveyors for each kiln.

The three 100-horsepower paddle-wheel fans which force dust through the collectors.

This arrangement of spouts is shown in one of the accompanying photographs. The screw-conveyors shown discharge the dust directly into the kiln-feed pipes along with the filter cake with which it mixes very satisfactorily.

Since the dust, amounting to approximately 70 pounds per barrel of cement production, is handled continuously, the problem of conveying and handling it was not difficult as

Distributor which divides collected dust equally among operating kilns. Individual screws for each kiln in foreground.

Dust collector and ducts from kilns. Fans and some of the collecting screws are also shown.

the quantity in pounds per hour was low in comparison to other phases of a cement plant. At the present capacity output of 4,500 barrels daily this means that 150 tons of dust is handled daily. Hence, the power consumption is comparatively low. The connected load is as follows: Three 100-horsepower motors on the fans, one 10-horsepower motor on the elevator, and seven 3-horsepower motors on the screw-conveyors while the collecting system for dust from the waste-heat boilers is powered by three 3-horsepower motors on the screw-conveyors and one 20-horsepower motor on the drag and screw.

This system has now been in operation for over a year with very satisfactory results, not only as regards economy and the upkeep of the system, but also the improvement in the condition of the surrounding country.

Lime *(from page 53)*

otherwise be idle because of the present low rate of demand for cement.

The stone used is obtained from the company's quarry at Fort Bellefontaine, 9 miles from the plant. The quarry has been worked selectively in two levels of which the upper level is providing suitable stone for lime manufacture as it contains strata of high-calcium limestone. The stone is crushed to 6-inch size and under at the quarry and is hauled in cars to the plant, where it is discharged to the secondary crushing station of Plant Number 2 (see PIT AND QUARRY, February, 1936, page 41). The stone is reduced by hammer-mills to 2-inch size and under and is fed by skips to a new Tyler Ty-Rock vibrating screen. Ultimately this will make two coarse sizes of rock and the fines will be used for cement manufacture. One coarse size will be loaded into cars for Plant Number 1. The other will go direct to Plant Number 2, which is now getting all the coarse rock.

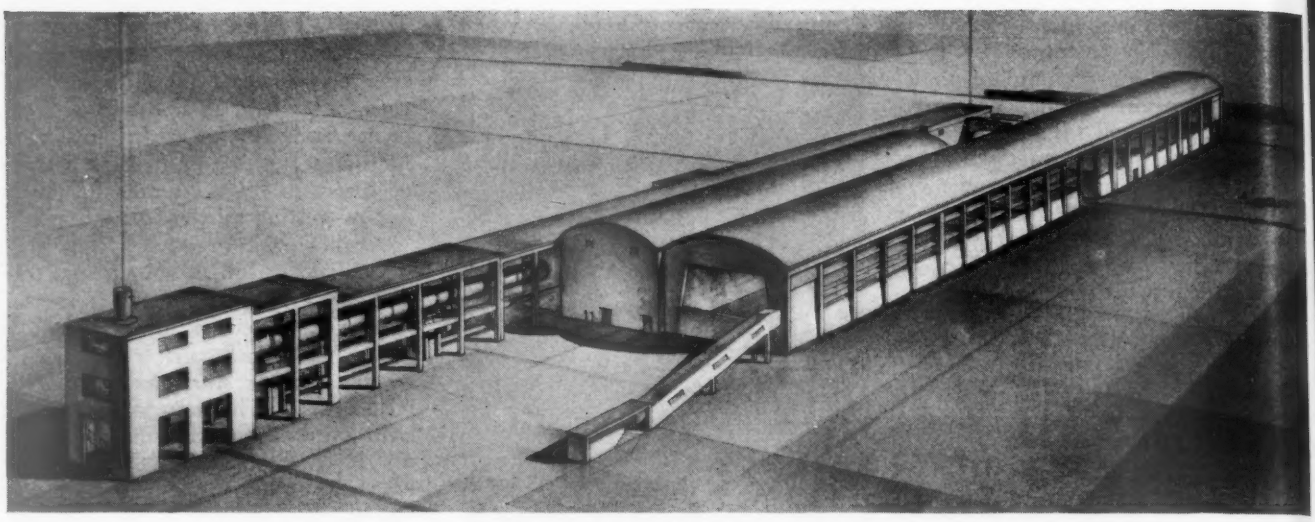
A short belt-conveyor feeds this stone from a bin to a long inclined belt-conveyor which feeds it to the slurry-feed spout leading into the kiln. The short conveyor is driven by the former slurry-feeder motor, reducer, etc., which are synchronized with the kiln motor. Both conveyors have Chain Belt Rex Stearns idlers and pulleys.

The 10- by 11¼- by 310-foot Smidth kiln is unchanged except that the heat-transfer chains have been removed. The same speed range is used as on clinker but the burning temperature is considerably lower. The pebble lime goes through the Unax coolers to the same Skipulter conveyor and Cylcup conveyor system used for cement clinker. The latter system discharges the lime through a spout into cars for shipment. A covered loading shed is provided for protection against rain.

At Plant Number 1 the carloads of sized stone will be discharged into a track hopper now under construction. An inclined belt-conveyor will discharge this stone into a kiln-feed bin. Two feeder conveyors, each driven by the synchronized slurry feeder motors will discharge the stone to kilns 3 and 4. These are 10- by 11¼- by 240-foot kilns from which the chains have also been removed. Kiln Number 3 has a rotary cooler and Number 4 has a Fuller grate-type cooler. A Peck carrier system will feed the pebble lime to a new covered hopper under which cars are loaded. Kilns 1 and 2 in this plant are reserved for cement manufacture.

Phosphate Production Increasing in West

Production of phosphate rock from the great reserves in the western states has been steadily increasing in recent years. The quantity sold or used annually has about doubled in the last five years, reaching a record total of 265,665 long tons in 1942, as reported by the producers to the Bureau of Mines. This was more than 60,000 tons greater than in 1941, and with a value exceeding $1,000,000 for the first time. The production in 1942 came from Idaho, Montana and Utah, as in 1941.



Architect's wash drawing of the new kiln, raw mill and storage buildings.

475-FOOT KILN, WELL-DESIGNED CONCRETE STRUCTURES, FEATURE MARQUETTE'S DES MOINES PLANT

another ON THE SPOT report

THE Marquette Cement Manufacturing Company, after it took over the plant of the Hawkeye Portland Cement Company on September 1, 1940, lost no time in starting a program of reconstruction and renovation to place these operations on a par with those at Oglesby, Illinois and Cape Girardeau, Missouri. The first step taken was the improvement of the quarry, which involved the introduction of several types of equipment new to the industry. This work was completed late in 1941. Work was meanwhile under way on the plant improvements which embraced almost all the departments of the old plant. Included in these were a new raw-material, clinker and coal storage building, new raw-mill and kiln buildings, power-plant additions, etc. This work was completed late in 1942. Other improvements are contemplated after the war.

In this plant the company followed its policy of using concrete construction wherever possible and the use of steel, other than for concrete reinforcement, was limited to the new machinery, machinery connections, protective devices, etc. Wherever possible existing equipment was used and in some cases it was transferred to other departments. Considerable planning was necessary to do this and yet obtain the high standards of product quality and operating efficiency which the company insists upon.

The new plant has a capacity of 3,200 barrels of standard Portland cement daily and is flexible enough to make almost any other type desired. At present only standard and high-early-strength cements are being made. Both meet the specifications for Number 2 low-heat cement without the addition of iron. The cement produced has a low expansion and high sulphate resistance.

Probably the outstanding features of this plant are the long kiln and cooler and the architectural design of the new buildings. The 475-foot rotary kiln weighs about 1,220 tons with its load and is said to be the longest kiln and also the heaviest rigid and integral piece of moving equipment in use anywhere in this hemisphere. The only longer and heavier kiln in existence is said to be located in Denmark. The 100-foot-long shaking-grate cooler is said to be the longest of its type in existence. The extreme length of this kiln and the use of heat-transfer chains in the rear end was decided upon in order to secure the maximum efficiency from the relatively low-grade fuel obtainable locally.

All the plant engineering was done by the cement company's forces, which also installed the equipment. The concrete structures were designed by J. L. McConnell & Associates and built by local contractors. The power-plant was designed by the Cowham Engineering Company.

J. C. Bennett, superintendent of the plant, held the same position in the old plant. William Moyle is quarry superintendent.

By W. E. TRAUFFER

History The Hawkeye plant, when built in 1910 by the Iowa Portland Cement Company, was a dry-process unit with a capacity of 3,600 barrels daily. In 1912 it was converted to the wet process and other changes made since increased its capacity to 4,500 barrels daily. New tube-mills and Kominuters were installed in both the raw- and finish-grinding departments in 1917, when the company was reorganized as the Hawkeye Portland Cement Company. In 1922 waste-heat boilers and a powerplant were added. In 1924 the present cement-storage silos were erected and in 1927 a 4,000-kilowatt General Electric turbine-generator was installed. The 32-compartment, 8,800-ton rock-storage bin built in 1932 was replaced by the present storage building. Originally only Hawkeye stand-

ard Portland cement was made but in 1932 Hawkeye Supreme high-early-strength cement was put on the market.

Quarry The company's quarry is at Earlham, Iowa, 30½ miles by railway southwest of the plant. The deposit is the Earlham limestone of the Pennsylvania Stage, Carboniferous System and consists of a 20-foot ledge with a downward slope of

Crushing building with counterbalances for car dumper to primary crusher.

1 per cent. to the southeast over most of its area. In the section now being developed the rock is beginning to slope a little to the northeast.

The rock has an average carbonate content of 78 per cent. but in places runs high in magnesia. In the rock are several small shale seams which are usually not quite sufficient for a balanced mix. Under the rock is a bed of high-silica Des Moines shale

The 475-foot kiln from the feed end.

and this is dug in places to a depth of about 7 or 8 feet below the quarry floor level to supply the additional shale needed. Below this is sandstone of which there is enough so that little needs to be added at the plant.

Typical Raw-Material Analyses

	Shale (*per cent.*)	Stone (*per cent.*)
Silica	48.86	13.96
Alumina	14.19	3.27
Iron	4.82	1.27
Lime	12.41	43.51
Magnesia	2.57	2.42
Ignition Loss	16.43	36.12

The overburden consists chiefly of clay and sandy loam and ranges up to 50 feet in depth with an average of about 25 feet. It is removed by contract with highly-efficient equipment and on a large-scale basis. During the winter of 1940-41 over 638,000 cubic yards of overburden was removed and it will be several years before additional stripping will be required. Some very interesting stripping methods previously used were described in the article referred to in the next paragraph.

The present quarry face is 3,400 feet long, but only part of it is being worked at this time. In 1940 the Hawkeye company had erected a

Discharge end of the kiln.

150-ton per hour commercial crushed stone plant at the quarry (see PIT AND QUARRY, May, 1933) and the section of the face then in use was being worked in two 10-foot levels, one for commercial stone and the other for cement rock. In 1933 the rights to additional property were obtained and the face was extended eastward to the present

This view shows the attractive concrete construction. The bridge and clinker-conveyor housing connect the kiln and storage buildings.

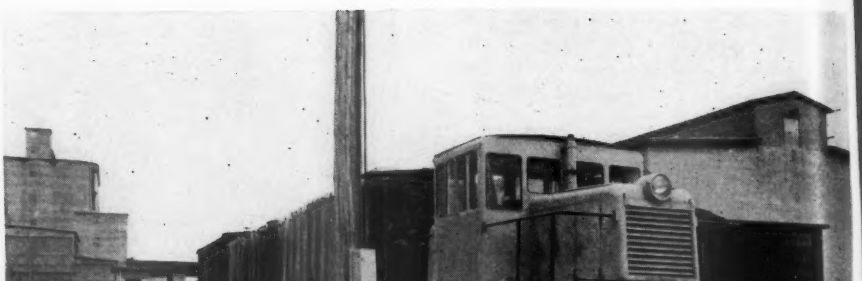
workings. The crushed-stone plant was abandoned in 1940 and some of the equipment has been installed in the cement plant. One-level operation of the quarry face has been resumed.

Drilling and Blasting The drilling of the face is done with a special drill rig consisting of a Caterpillar D8 tractor on which are mounted two 230-cubic foot Davey compressors. The rig also has a LaPlant-Choate bulldozer attachment on which two Ingersoll-Rand X71 drifter drills using 1¼-inch steel are mounted on universal supports. The compressors supply air for these drills and for whatever secondary drilling is found necessary.

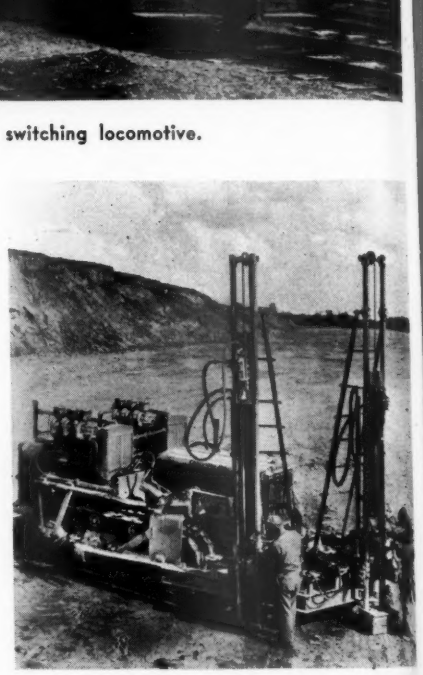
In operation this rig moves along parallel with the face with the two drills so arranged that two staggered rows of holes are drilled 5½ feet back from the face and 5½ feet apart with 14½-foot spacing between holes. The time lost in moving the rig is kept down by letting the two drill operators take care of this job alternately. One of the drills finishes its hole first and its operator gets the machine in readiness for the next 14½-foot move. When the second hole is finished, he moves the rig and the second drill operator starts his hole first while the rig is again being secured in position. The second operator is then in position to operate the rig on its next move, and so on. In this way only 30 seconds elapse on every move from the time the last of one pair of holes is finished and the first of the next pair is started. This self-contained rig eliminates the constant shifting of air-lines which would be necessary using orthodox methods on such a shallow face and it can also be moved out of the way quickly when blasting or into the shop for repairs.

The holes are drilled to a point about a foot below the quarry-floor level. Twenty holes are usually detonated at once. The 1¾-inch holes are loaded with 1½-inch sticks of 45 per cent. Atlas Gelamite or Geladyne, depending on the nature of the deposit. Gelamite is used when extra-hard rock is encountered and the Geladyne when there is shale and clay in the top rock strata. The rock fractures well on the average and comparatively little secondary shooting is necessary. In one 7-hour day, when 2,175 tons of stone was loaded by the 2½-cubic yard quarry shovel, only three secondary shots were necessary. The yield on the primary blasts averages 5 tons per pound of explosive. The shots are detonated electrically.

Blasting is done daily. The drill gang consists of the two drillers and a blaster who follows the rig and loads the holes. At quitting time the rig is moved away and the shooting

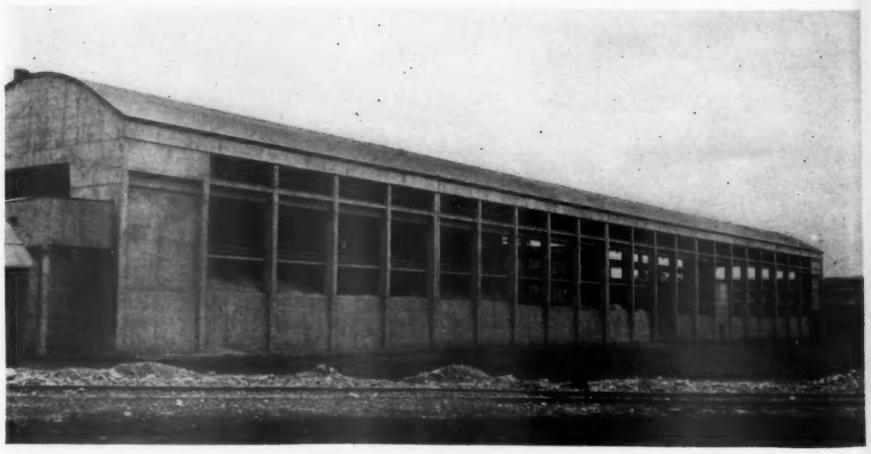


The 45-ton Diesel-electric switching locomotive.



Self-contained drill rig mounting compressors and two drills.

Shown in this view are the crushing, storage, raw-mill and kiln buildings.

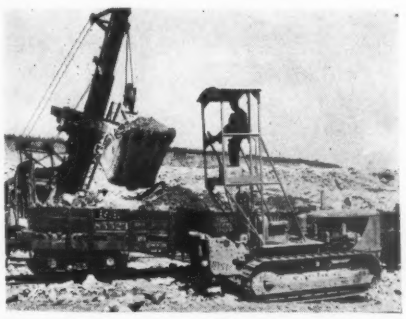


The 80- by 500-foot storage building.

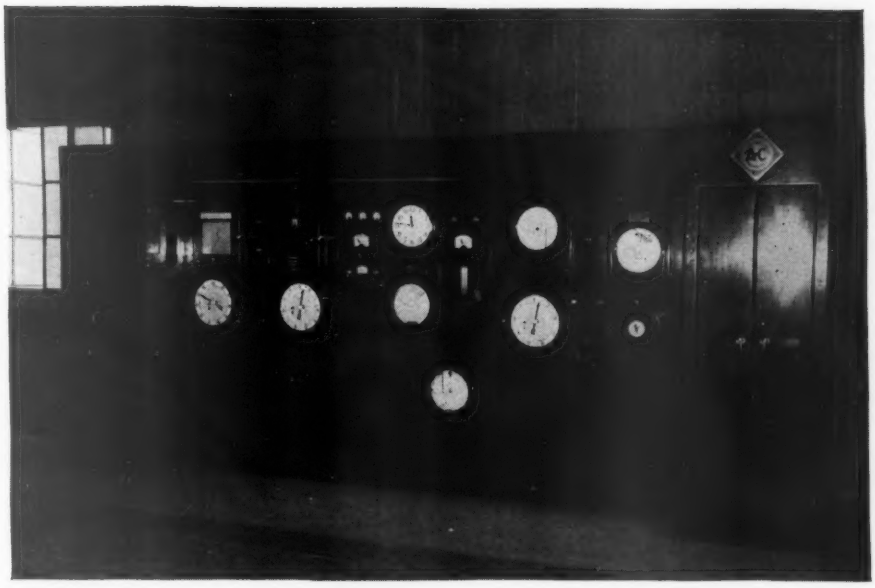
is done. In this way the holes seldom have time to get wet. The secondary shots are made first.

Loading and Hauling The stone is loaded by an 80D Northwest shovel with a 2½-cubic yard dipper and a Murphy Diesel engine. This loads the stone, at the rate of 300 tons per hour under ordinary circumstances, into standard 50-ton railroad gondola cars which are spotted in units of five and loaded and moved without uncoupling. This work is done by a special Caterpillar D8 tractor with a high tower from which the operator can see into the cars and over them for safe and efficient operation. A Willamette Hyster drum and cable are used.

Standard-gage tracks with 85-pound rails are used and these are moved as necessary by a Nordberg track shifter. A Caterpillar D8 tractor with a bulldozer is used for cleaning up the quarry floor, removing snow, etc. A truck with an 800-gallon fuel tank is used to supply fuel for all this equipment and also carries a pressure grease gun.



Winch-equipped tractor for moving and spotting cars in quarry.



Control board for the kiln, cooler and coal-mill.

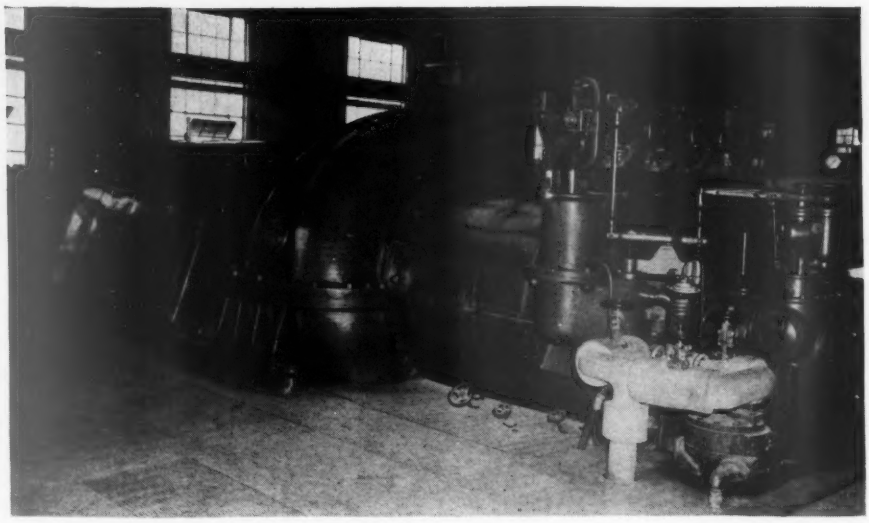
The cars are hauled to and from the face by a 65-ton General Electric Diesel-electric locomotive. It is powered by two 200-horsepower Cummins supercharged Diesel engines and easily hauls 3 loaded cars 3,000 feet up a 3 per cent. grade to the Rock Island Railway siding. En route the cars are weighed on a 100-ton Fairbanks track scale which has a 55-foot platform. The locomotive makes a round trip about every 45 minutes. A train of cars is taken from the quarry to the plant and back once daily.

The quarry has modern facilities, including a wash and locker building with a modern washroom, leaning-top lockers, etc. There is a complete repair shop which is equipped with a drill press, drill sharpener, lathes, emery wheels, etc, All the drill steel used is formed in this shop by equipment which forms and tempers the bit and forms the shank. Bits are also re-sharpened. There is a deep-well water-supply system and a fuel-oil system with a Sharpless centrifuge. All the motors are driven from current supplied by a 20-kilowatt Caterpillar Diesel generator.

The 65-ton Diesel-electric quarry locomotive.

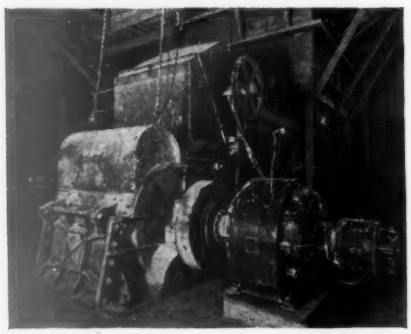
Looking toward discharge end of the air-quenching clinker cooler.

Primary Crushing At the cement plant the cars are delivered to the primary crushing department which has not been changed. A car is run on the deck of a McMyler-Interstate balanced car dumper which lifts the car 30 feet vertically and then tips it over to dump its load on an apron chute leading to the No. 18 Mammoth McCully 36-inch primary gyratory crusher. The minus-10-inch product of this crusher is carried on a 54-inch Jeffrey inclined pan-conveyor to a 200-ton surge bin. A 48-inch horizontal pan-feeder discharges the stone into the Gruendler Type XXB hammer-mill secondary crusher which is driven by a 300-horsepower Allis-Chalmers synchron-



Turbo-generator in power-house.

ous motor. This hammer-mill has the usual flywheel on its far side and on the driven side is another one in which a Falk Airflex coupling is incorporated. This mill is reducing its feed to 95 per cent. through 1 inch at the rate of over 200 tons per hour. It replaced two old hammer-mills, a screen and two feeders.



Hammer-mill which does secondary crushing.

This mill has given excellent service. When the hammers become worn a plate is removed and the hammers are built up with Stoodite without being removed from the machine.

The product of the hammer-mill is discharged on a 36-inch by 283-foot cross belt-conveyor followed by a 30-inch by 348-foot belt. This is inclined to the new storage building and is then horizontal for the full length of the stone-and shale-storage section. A motorized traveling tripper discharges these materials to storage. This equipment was supplied by the Link-Belt Company.

The storage building is 500 feet long, 80 feet wide and 60 feet high and is built entirely of reinforced concrete. It has concrete columns and crane girders and an arched concrete roof. Both ends and one side are open with 12-foot-high retaining walls on the other side and similar walls dividing the building transversely into seven separate storage compartments. Beginning at the raw end, these compartments contain limestone (18,000 tons), silica (750 tons), iron cinders (900 tons), diaspore (750 tons), shale (4,000 tons), coal (1,200 tons), clinker (30,000 barrels), and gypsum (950 tons).

Two standard-gage tracks, parallel to the cross walls, pass through this building at the yard level. One is between the bins for cinders and diaspore, which are received in cars from outside sources. The other is between the coal and clinker bins and is used for coal and gypsum. All these materials are unloaded from cars by a 75-foot span P&H overhead traveling crane which has a 3-cubic yard Blaw-Knox bucket and distributes them to storage and reclaims them as needed.

Raw-Material Grinding The crane feeds the raw materials, usually only stone and shale, into the row of 80-ton mill-feed bins, of which there are two for limestone and one for iron, diaspore

Unit coal mill which fires the kiln.

and shale. Cradle feeders are used under the limestone bins and wagon feeders under the others. The preliminary mixing of the desired raw materials is begun at this point as they are discharged on a 24-inch by 59-foot belt-conveyor. This conveyor is followed by a 42-foot bucket-elevator and a 15-inch by 40-foot drag-chain conveyor to the 50-ton feed bins over the two preliminary raw-grinding mills. Schaffer Poidometers feed the raw materials into these mills and the required amount of water is measured by Fisher constant - pressure meters. These two 9½ by 5½-foot Allis-Chalmers Preliminators are driven by 250-horsepower, 2,200-volt syn-

Preliminary mills in the raw-grinding department.

SLY DUST CONTROL

SALES AND ENGINEERING DATA

SLY AUTOMATIC-CONTINUOUS DUST FILTERS

No. 68 Type 360 Sly Dust Filter for AUTOMATIC-CONTINUOUS Operation. This Sly Dust Filter is in use in the "Finish Mill" of a cement plant, for controlling the dust from –
a Feed Bin
a Tube Mill
a F.K. Pump Hopper
an Elevator
a Fines Conveyor
a Tailings Conveyor

Uninterrupted 24-hour-per-day operation – automatic.

The above photograph shows the following equipment and features:

(1) Cloth bag Dust Filter with motor shaker drive at each end
(2) Access door to inside of filter
(3) Two dust hoppers with continuous discharge valves
(4) Motor drive with sprockets and chain for continuous valves
(5) Dust spouts for continuous return of dust to flow of material
(6) Clean air ducts with motor operated dampers for alternately shutting off one or the other dust filter section
(7) Safety relief door
(8) Clean air pipe to exhaust fan inside of building
(9) Standard support with walkway and railing around dust filter

The clean air duct with dampers may be attached to side or top of filter.

THE W. W. SLY MANUFACTURING CO.
CLEVELAND, OHIO

DATE Nov. 12, 1941 | NO. 82-L

ore than 5,000 Sly Dust Control
stallations in successful operation.

In the rock products field many processes requiring dust control are continuous. For these conditions the Sly Automatic Continuous Dust Filter is highly satisfactory. ★ The data sheet (above), showing an installation for a large cement plant, gives some features of the equipment. If you will write us fully about your conditions, we shall be glad to tell you exactly what can be accomplished.

THE W. W. SLY MFG. CO. • 4746 TRAIN AVENUE, CLEVELAND, OHIO

chronous motors. Four-inch Morris centrifugal pumps feed the slurry to individual 4- by 6-foot Allis-Chalmers Utah fully-inclosed vibrating screens. These are equipped with 12-mesh cloth from which the oversize material is returned by gravity into the mills. These mill circuits are entirely independent of each other. Space has been left for additional screens.

The fines from both screens flow into an agitating screw-conveyor which discharges the slurry into a 450-cubic foot tank equipped for air agitation. Another 4-inch Morris pump feeds this slurry to the Ferris-wheel feeders of the four Smidth Type E-18 final grinding tube-mills. The overflow from these feeders returns by gravity to the tank. These four mills, with their motors and control equipment, were transferred bodily from the old plant. They are driven by 225-horsepower General Electric slip-ring motors.

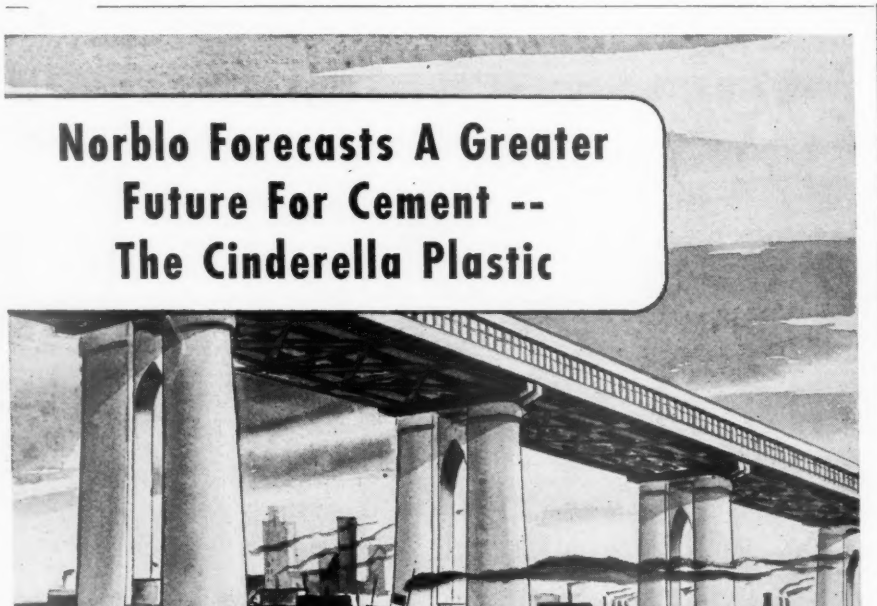
Slurry Blending The slurry from both these mills is fed by a mixing screw to a 4-inch Morris pump. This discharges it into any of four 15-foot-diameter by 39-foot blending tanks or into the first two of eight 25½- by 39-foot blending and storage tanks, all of which are equipped with Manitowoc

Pair of 4-inch pumps which feed slurry from last pair of tanks.

Minogue mechanical and air agitators. The small tanks are used for high-lime, high-iron, high-alumina, and high-silica slurries and supply whatever correctives are necessary for the final mix correction. Current practice is to feed a blended slurry from the first pair of large tanks and any desired number of the small tanks into the second pair of large tanks. Thence the slurry is fed to the third pair of large tanks by which time the desired analysis will have been usually obtained. The last two pairs of tanks are used for storage. If desired, an additional blending stage can be obtained by first blending from the small tanks into the first pair of large tanks, and so on. The fourth pair of large tanks is used for the storage of corrected slurry for the kiln feed. The eight large 2,000-barrel tanks have sufficient capacity for four days of kiln operation. This makes it possible to hold a mix for several days without making any major adjustments.

The homogenization and transfer of the slurry through these tanks is taken care of by Morris slurry pumps which are so connected that any de-

One of the two 8-inch slurry pumps.



●By any definition and by all odds cement is the most important and most useful "plastic" so far discovered. It is just as "synthetic" as the latest front page marvel and its continuous kiln was the pioneer continuous chemical process.

Like Cinderella, pushed into the background by a more showy and assertive sister industry, cement will inevitably be a princess when peace returns and the nation resumes building highways, dams, levees, bridges, elevators and industrial shelter of all kinds.

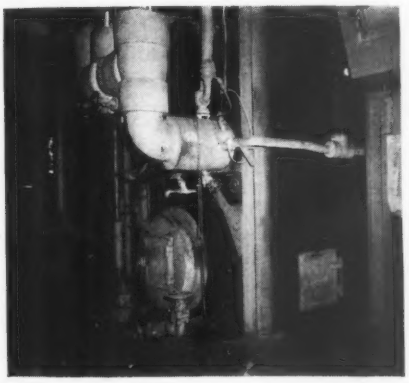
In the post-war era, the cement industry will have in Norblo Dust Collecting Equipment an important ally in production and plant maintenance.

Norblo
DUST COLLECTION
THE NORTHERN BLOWER COMPANY
6409 BARBERTON AVENUE • CLEVELAND, OHIO

sired combination is possible. A 4-inch pump is provided for each pair of small tanks and an 8-inch pump for each four large tanks. A final pair of 4-inch Morris pumps feeds the corrected slurry from the final pair of large tanks to the kiln-feed building. American Car & Foundry Company plug-type slurry valves are used.

The overflow from the Ferris-wheel kiln feeder varies from 50 to 100 per cent. of the actual feed to the kiln. This helps to keep an even mixture as this slurry, pumped from the bottom of a kiln-feed tank, is fed back into it at the top along with new slurry.

The building housing the raw-grinding and blending department is 240 feet long, 72 feet wide and 55 feet high and is similar in construction to the storage building except that it is totally inclosed. The window area has been greatly reduced to avoid excessive maintenance expense, and excellent ventilation, especially over the slurry tanks, is provided by exhaust fans.



Unit boiler which produces steam for power-plant.

Burning The kiln building is the third unit in the group of new all-concrete structures and is similar in design to the others. It is 635 feet long, varies from 30 to 45 feet in width, and has an average height of 47 feet. The feed and cooler ends and the portion adjacent to the raw mill are inclosed, the side walls being omitted for other portions. The closed parts are ventilated by means of power-driven fans, no dependence being placed on natural ventilation. Housed in this building are the kiln, clinker cooler, coal-preparation machinery, kiln-feed mechanism, and departmental auxiliaries.

Hammer-mill which reduces coal for firing boiler.

The all-welded Allis-Chalmers rotary kiln is 475 feet long and 11 feet 6 inches in diameter. It has a slope of $\frac{7}{16}$-inch per foot, rests on seven sets of 48- by 24-inch solid forged-steel carrying rollers, and is driven through V-belts, a Falk gear reducer and gears by a 125/150-horsepower Allis-Chalmers adjustable-speed direct-current motor. Slurry is fed into the kiln by a Ferris-wheel feeder which is driven through a No. 215 Allis-Chalmers variable-pitch type speed changer by a 5-horsepower direct-current motor which operates in synchronism with the kiln motor.

The kiln is equipped with 19,600 lineal feet of $\frac{5}{8}$-inch chain beginning 5 feet from the metal retaining ring at the feed end and extending

This trowel had thirty lives!

Even after shaping 30,000 feet of concrete pipe, the surface wear it showed was within permissible tolerance!

EMPLOYED FOR SHAPING the bell-end of machine-made concrete pipe, this revolving trowel had to continuously withstand the grueling abrasion of crushed stone, sharp sand, and cement aggregate. A terrific punishment! Neither Swedish steel nor hardened tool steel could take it! Even a trowel cast of alloy steel quickly succumbed so that costly replacement became necessary every 800 feet.

Finally, Coast Metals Hard-Facing was tried. The trowel was made of a low carbon steel, cast undersize and then built up to dimensions with an exceptionally wear-resistant Coast Metals Coating. The results proved outstanding! Over thirty times the best service previously obtained!

Why not try Coast Metals Hard-Facing in solving *your* wear-resistance problem?

COAST METALS, INC.
Plant and General Offices: Canton, Ohio
Executive Offices: New York, N.Y.

COAST METALS
hard-facing weld rods

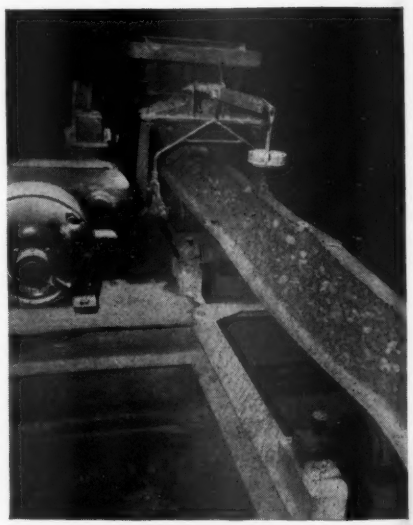
YOUR EQUIPMENT'S LIFE PRESERVER AGAINST WEAR

105 feet into the drying zone. Beginning at its discharge end the kiln has 14¼ feet of 70 per cent. alumina brick 47¼ feet of Harbison-Walker "Magnite" basic magnesite brick, 33½ feet of 9-inch 70 per cent. alumina brick, 200 feet of 6-inch 40 per cent. alumina brick with 2½ inches of insulation having ¼ inch of cement on each side, 68 2/3 feet of 6-inch 40 per cent. alumina brick and 71 1/3 feet of 4½-inch wear-resisting hard block in the chain section. The last 40 feet of the kiln at the feed end, extending 35 feet into the chain section, is not lined. The alumina brick is of Green, Mexico and Harbison-Walker manufacture. A novel feature of this installation is the air jacketed kiln end and an air-jacketed seal. The parts subjected to high temperature are of heat-resisting steel and the cooling air is supplied by an independent blower unit.

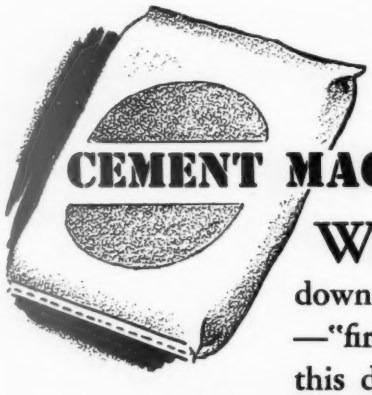
A Bailey fan, with a capacity of 150,000 cubic feet per minute at 4 inches of static pressure, supplies draft for the kiln and exhausts the waste gases to atmosphere through a steel stack. This fan is driven by a 200-horsepower, 2,200-volt General Electric motor. Automatically-controlled louver dampers in the fan inlet connections maintain constant draft conditions.

Motor and drive of kiln.

Experiments are still being conducted to determine the most efficient kiln balances for various operating conditions. The kiln capacity is estimated to be over 3,200 barrels and this figure has already been exceeded for short periods without pressing the kiln. It is now being operated on a 2-inch draft with an average exit-gas temperature of 500 degrees F. and with clinker being discharged at a temperature of 1,800 degrees. The latter temperature is recorded by a Ray-O-Tube pyrometer aimed at a point past the burning zone. The primary air has an average temperature of 145 degrees F. and is a blend of air from the coal mill and from outside. The moisture content of the slurry averages 39 per cent. but this is varied considerably to meet changing raw-material conditions as it is deemed more impor-

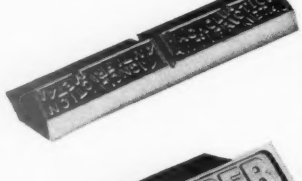


Conveyor-type weighing feeder to one of the preliminary raw mills.



First Aid
FOR
CEMENT MACHINERY BEARINGS

When bearings fail ··· machinery is down... and production is at a standstill —"first aid" is needed in a hurry. But, this does not mean that ANY bearing metal should be used just to return the equipment to production. To prevent future headaches, replace with the PROPER metal for the individual application.



MAGNOLIA ANTI-FRICTION METAL — Service records prove the ability of this metal to absorb grit and dust, and still provide an excellent bearing surface with low coefficient of friction. Widely used in cement mills for conveyors, motors, fans, tube mills and general machinery.

ADAMANT AND DEFENDER—Adamant Super Genuine Babbitt or its wartime substitute, Defender Metal, is recommended for applications where severe shock loads are encountered. For example, use one of these metals for the bearing linings of internal combustion engines.

MAGNOLIA ISOTROPIC DIE-CAST BRONZE—Magnolia bushing bars are used for general maintenance of bronze bearings. They are cast by an exclusive process which provides a very dense grain structure, and are free from imperfections. Available in semi-finished stock bars, either solid or cored, in sizes up to 11" O.D.

WRITE FOR BULLETIN

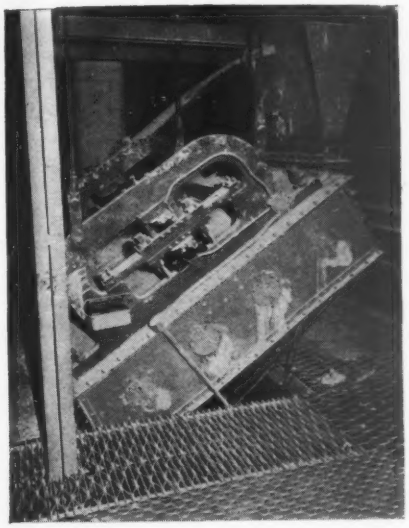
Cement mill operators are invited to write for FREE, 8-page bulletin. Includes table showing proper metals to use for tube mills, crushers, dryers, conveyors, shaker screens, motors, fans, Diesels, etc. Describes effective substitutes for genuine babbitt.

MAGNOLIA METAL CO. • ELIZABETH, N. J.

MAGNOLIA BEARING METALS

tant to maintain a uniform viscosity in order to insure uniform flowability of the slurry through the chains than to maintain a uniform slurry moisture content. The viscosity is controlled by means of a device of original design.

The Allis-Chalmers kiln control board is exceptionally complete yet compact. Every measurable factor affecting the kiln, cooler and coal mill are shown and recorded on the



Electric vibrating screen in closed circuit with one of the raw mills.

instruments on this board, which are chiefly of Leeds-Northrup manufacture and include a complete Leeds-Northrup system of combustion control. On this board also are located all the controls used by the burners in operating the kiln, rheostats, switches, etc.

Kiln Firing The kiln is fired with pulverized coal by a Babcock & Wilcox Number E-56 direct-firing mill. A local Iowa coal, which averages about 9,000 B.t.u.'s per pound as received, is used. On the dry basis this coal contains about 18 per cent. ash and 5.7 per cent. sulphur. The moisture content at the mill varies from 3½ to 4 per cent. and, under present kiln operating conditions, the mill is grinding about 8 tons per hour to a fineness of 92 per cent. through 100-mesh and 70 per cent. through 200-mesh. Drying air for this mill is held at 400 to 425 degrees F.

Dust collector connected to clinker cooler.

The coal is unloaded from cars to the storage building as already described. The same overhead crane feeds this coal into a concrete bin from which a 15-inch drag-chain conveyor carries it to an 18-inch inclined belt-conveyor. This has a Dings magnetic head pulley and a Cutler-Hammer suspended magnet to insure the removal of all the iron that may be present in the coal. The coal is discharged into a Gruendler hammer-mill from which a bucket-elevator and a drag-chain conveyor carry it to the coal-mill feed bin.

Clinker Cooling The clinker is discharged from the kiln at a temperature of about 1,800 degrees F. into the 4½- by 100-

Why the Vane in the MULTICLONE Improves Dust Collecting Efficiency

Uniform Gas Distribution Means Dust Recovery

IN REMOVING dust, fly ash and other suspended particles from gases, mechanical separators whirl the gas into a cyclone which centrifugally throws out the suspensions. Efficiency of this action depends upon the uniformity with which the whirling gas is distributed in the tube. The more uniform the distribution the greater the effect of centrifugal action upon *fine* as well as coarse particles, resulting in more complete recovery of ALL suspensions.

The VG Type MULTICLONE

In Conventional Cyclones gas enters through a single port in the side of the tube, forming a concentrated gas flow which leaves open spaces where eddies and secondary types of flow can form to cause turbulence and impair the cleaning efficiency of the unit.

In The Multiclone the *vane* distributes incoming gas into *eight* smaller cyclones, *uniformly spaced* around the separating tube. This finer break-up promotes smoother flow, better separation, higher recovery, improved efficiency!

This is just one of *many* basic advantages incorporated in the MULTICLONE... advantages that improve efficiency, decrease installation costs and reduce maintenance. Get the *full* story before installing any recovery equipment. Send for booklet!

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

MAIN OFFICES: 1015 W. NINTH ST., LOS ANGELES, CALIF. • CHRYSLER BLDG., NEW YORK
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PRECIPITATION COMPANY OF CANADA, LTD. • DOMINION SQUARE BLDG., MONTREAL

buell... ARE MADE OF METAL

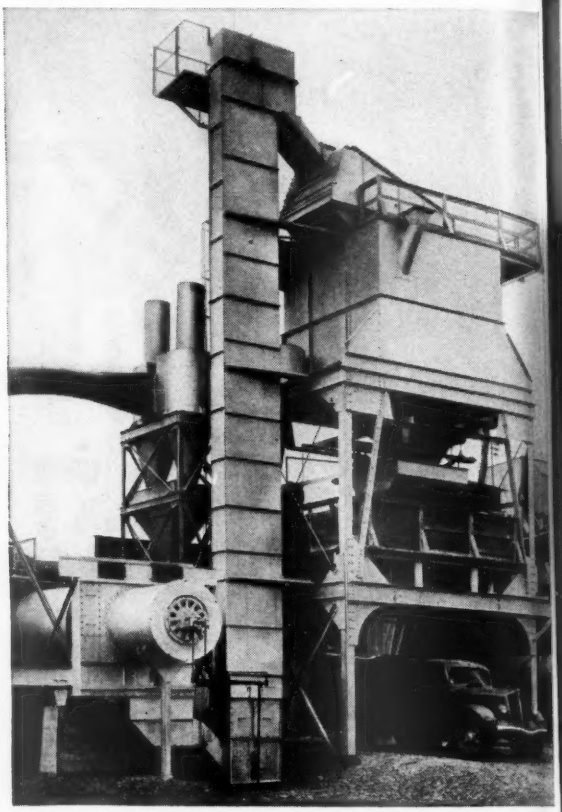
DUST RECOVERY SYSTEMS

Buell's present position in the field of mechanical dust collection for the rock products industry is the result of the exclusive van Tongeren design (offered only in Buell Dust Recovery Systems) which utilizes the energy of the "double eddy current" phenomenon to produce a high collection efficiency without having to resort to small diameter cyclones.

Buell's use of large diameter cyclones produces two important results:

1. *It permits the use of heavier metal (3/8" thick) for extra long life and negligible maintenance.*
2. *It reduces abrasive action.*

Buell (van Tongeren) Dust Recovery Systems, handling gas volumes from 500 c. f. m. upwards, are now in successful operation with Kilns, Dryers, Raw Mills, Finishing Mills, Clinker Coolers, Waste Heat Boilers and Asphalt Plants.



Two Buell (van Tongeren) cyclones in asphalt plant.

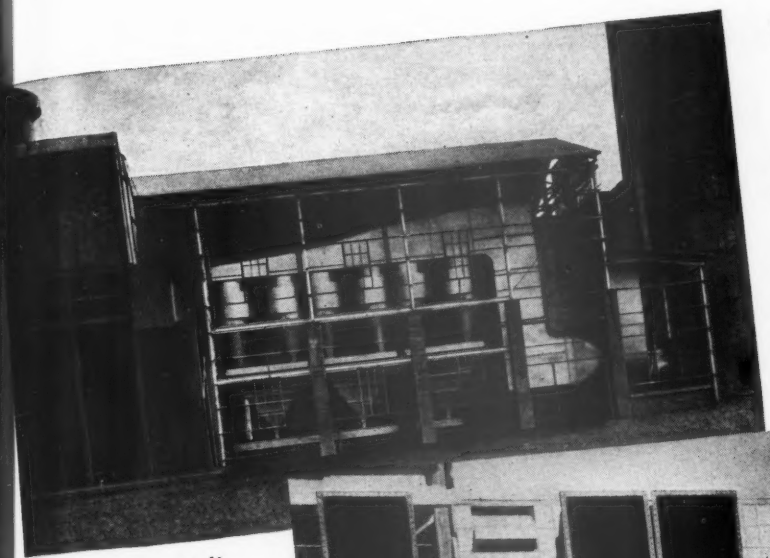
Typical Users of Buell Equipment in the Rock Products Industry

DEWEY PORTLAND CEMENT COMPANY
HETHERINGTON & BERNER, INC.
KOSMOS PORTLAND CEMENT CO.
LEHIGH PORTLAND CEMENT CO.
LONE STAR CEMENT CORP.
MEDUSA PORTLAND CEMENT CO.
STANDARD LIME & STONE CO.
VALLEY FORGE CEMENT CO.

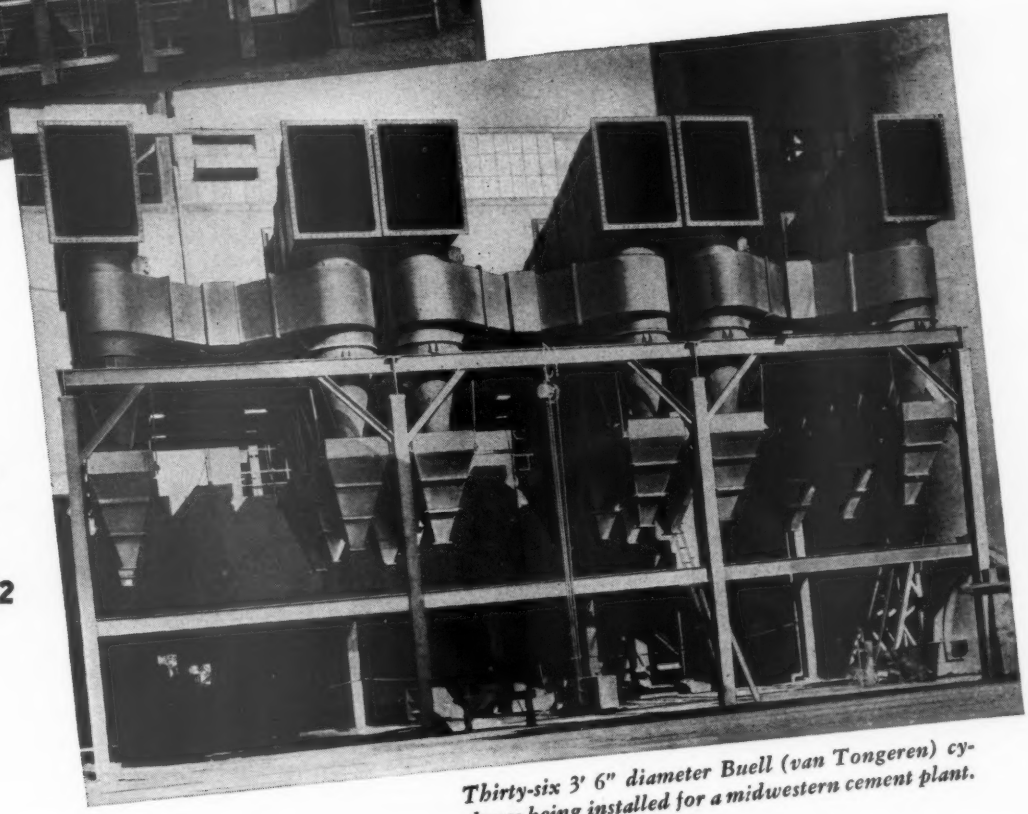
BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST

THIS THICK.. ..FOR:

Long Life
High Efficiency
Low Maintenance
Low First Cost



... of twenty-four 4' 6" diameter Buell (van Tongeren) cyclones operating on cement kilns.



Thirty-six 3' 6" diameter Buell (van Tongeren) cyclones being installed for a midwestern cement plant.

...end for your copy of Buell's new, factual 28-page book. ...k for Bulletin G-842

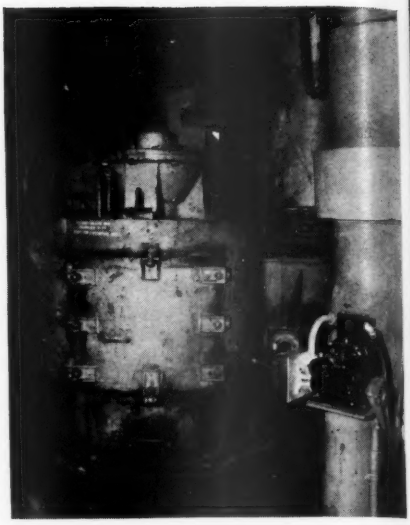
BUELL ENGINEERING COMPANY, INC.

Suite 5000, 12 Cedar Street, New York

SALES REPRESENTATIVES IN PRINCIPAL CITIES

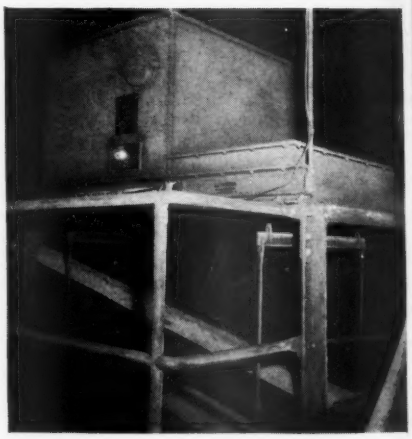
foot Allis-Chalmers air-quenching type cooler. Because of foundation and structural conditions this cooler was placed so as to be continuous with the kiln which accounts for the unusual length of the kiln building. A curtain inside the cooler divides it into primary- and secondary-cooling sections for which the air is drawn in through separate ducts. The clinker is fed into the cooler through a chamber independent of the secondary-air duct in order to keep down the amount of dust returned to the kiln with the secondary air. The reciprocating motion which conveys the clinker over the grates in the cooler also carries the dust which falls through the grates along the air ducts. The cooler is driven by a 15-horsepower motor. A Multiclone dust collector is connected to the cooler waste-air stack to prevent dust loss.

The dust and clinker are discharged together at a hand-held temperature on a 24-inch by 212-foot centers inclined belt-conveyor with Imperial Belting Company "Sahara" heat-resisting belting. A Merrick Weightometer keeps a continuous record of the amount of clinker produced. This conveyor discharges the clinker into its section of the storage building, from which it is reclaimed by the overhead crane by the same layer system used in other Marquette plants which results in a thorough blending.



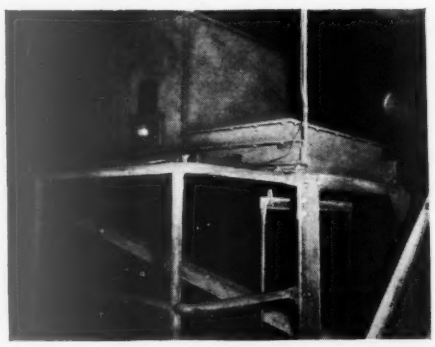
One of the direct-firing coal mills in the power house.

Clinker Grinding The crane feeds the clinker and gypsum into separate concrete bins from which they are fed in the desired proportions to a long belt-conveyor. A pan-feeder is used for the clinker and a Hardinge constant-weight feeder for the gypsum and their drives are electrically interlocked. The mixture is discharged from the conveyor into feed bins over the three Smidth Number 85 Kominuters. Table feeders supply these mills which have self-contained screens with ⅛-inch openings. Their product is discharged into a screw-conveyor followed by a bucket-elevator, which feeds it to eight Tyler-Hum-mer screens equipped with 20-mesh cloth. The oversize material from these screens is discharged by



Weighing device on conveyor carrying clinker from cooler to storage.

They're using MERRICK SCALES

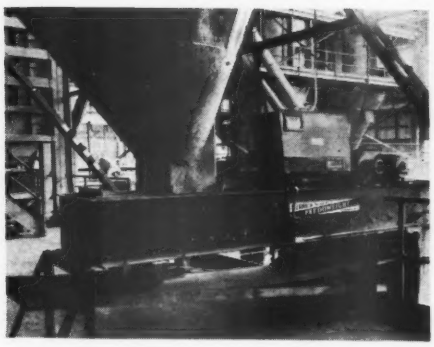


in IOWA

where the Marquette Cement Mfg. Company has just completed a plant modernization program. A MERRICK Weightometer operating over a belt conveyor weighs and records the clinker passing from the cooler to storage. It provides a constant check on kiln output and efficiency, and supplies a file record of raw material and coal fed to the kiln.

in CALIFORNIA

where the Los Altos Permanente plant employs a number of MERRICK Feedoweights for feeding clinker and gypsum to the screw conveyors supplying the mills. Additional Feedoweights feed the primary raw grinding ball mills, while portable, carriage-mounted Feedoweights reclaim clinker from storage.



and all around the country

you'll find MERRICK SCALES supplying an economical and dependable check on production.

WEIGHTOMETER provides a continuous, automatic and accurate record of bulk materials in transit.

FEEDOWEIGHT weighs, totals and records the amount of material fed. Also correctly proportions two or more materials in continuous or batch feeding.

Write for Bulletins

MERRICK SCALE MFG. CO. **Passaic, N. J.**

GRUENDLER—BUILDERS OF HEAVY DUTY PULVERIZERS SINCE 1885

Latest Gruendler Swing Hammer CRUSHER installed in the Iowa *Marquette Cement Plant**

○

Capacity
300 Tons Hourly
Using 300 H. P.

○

This is one of Three Large Gruendler Crushers in use by Marquette whose experience after ten years of service with two Gruendler Units, has proved—

ECONOMICAL,
PROFITABLE,
DEPENDABLE

○

In view of the work accomplished by our machines, increased capacity on tube and compeb mills was had with very surprising results.

***Photo reproduction of Gruendler's Latest Hammer Crusher installation in The Marquette Cement Plant, Des Moines, Iowa.**

Write us Today for illustrated Bulletins, Specifications or Plant Set Up Blue Prints on our Primary and Secondary Heavy Duty HAMMER CRUSHERS.

Over 57 years of pioneering the swing hammer principle has now proved that Gruendler Primary as well as Secondary Hammer Mills are a standard for comparison. They are constructed heavily, smooth in operation, roller bearing equipped, showing savings many times as high as 90% in lubrication over older type installations not so equipped. For large capacities, uniform crushed material, economical operation, a Gruendler unit is outstanding and bears your careful inspection and consideration.

GRUENDLER
CRUSHERS · PULVERIZERS · GRINDERS

"GRUENDLER'S Long Experience—Sturdy Construction has been proved best by test, with Greater profits to Users"

GRUENDLER CRUSHER & PULVERIZER CO.

Plant and General Offices—2905-15 N. Market St., ST. LOUIS, MO.

gravity into a fourth Kominuter which has no screen. The product of this mill is discharged into the same screw-conveyor. The equipment in this department is connected to a Sly dust-collector.

The minus-20-mesh material passing through the Hum-mer screens goes into bins from which Smidth screw feeders discharge it into three Number 20 Smidth tube-mills. These are driven by 350-horsepower General Electric super-synchronous motors.

Cement Storing and Loading The product of these mills is finished cement which goes to two 7-inch Fuller-Kinyon pumping systems. One system feeds the cement into the old 205,000-barrel stock-house and the other to the 105,000-barrel storage silos. Packing is done by eight 3-spout St. Regis Valve Bag packers and there are also facilities for bulk-loading.

All bulk shipments are weighed on the 335,000-pound Fairbanks track scale formerly used at the commercial rock plant. This has an 80-foot platform and is also used for weighing incoming coal.

All the switching about the plant is done by a 45-ton General Electric Diesel-electric locomotive which is powered by two Cummins Diesel engines.

Power The fourth new building is that housing the power-plant which supplies all the electricity and steam required to operate the plant. This building is also of reinforced-concrete construction and houses, in addition to the boiler and generators, all the auxiliaries, and the coal- and ash-handling equipment. Ventilation is provided by forced draft fans.

The coal is received in cars and is fed from the track hopper on a belt-conveyor from which it is discharged into a Williams hammermill. A bucket-elevator feeds the coal at the rate of about 50 tons per hour to another bucket-elevator from which it is discharged into the 80-ton coal-mill feed bin. This bin serves two of the Babcock & Wilcox Type B132 direct-firing coal mills which formerly fired the kilns in the old plant and which were rebuilt before being installed in this department. These mills now fire a new Babcock & Wilcox unit boiler which has a capacity of 50,000 pounds of steam per hour at 450 pounds pressure and 750 degrees F. final temperature.

The main generating unit is a 4,000-kilowatt 175-pound General Electric turbine which drives a 5,000-kilowatt, 3-phase alternating-current generator at 3,600 r.p.m. This turbine is operated at 250 pounds steam pressure with 75 degrees of superheat because it is now impossible to secure the necessary parts to convert it into a more efficient 450-pound unit with a steam temperature of 750 degrees F. There is also a 1,500-kilowatt direct-current generator which supplies current for old and new direct-current motors in the plant. No power is purchased except when the entire plant is shut down.

The turbine room also contains all the power-production auxiliaries, switchboards, steam - condensing equipment, 2 Allis-Chalmers boiler feed pumps, an evaporating system for boiler-water make-up, two small direct-current generators, and an air compressor. An automatic ash-handling system feeds the ashes to a hopper for removal by either car or truck.

A new fire-protection pump in this building serves the entire plant, and fire hydrants form a ring around the buildings. Water for condensing purposes and for the slurry is pumped from the Raccoon River, 3,000 feet distant from the plant, into a newly-enlarged spray pond near the power-plant. Only enough water is pumped to make up for the water used in the slurry or lost through evaporation.

Control Much has been said in this article about the complete system of mechanical control and about the chemical control which together make possible the economical production of a uniformly high-grade cement. Important in the attainment of this control are the complete chemical and physical testing laboratory and its staff headed by J. V. Mandia, chief chemist. The laboratories were completely modernized and rebuilt in 1939. The equipment used includes a Southwark-Emery 75,000-pound hydraulic compression-testing machine, a Monel metal moist cabinet, a Wagner Turbidimeter, calorimeters, miniature grinding equipment, a temperature-controlled room, etc.

The laboratories are housed in the same structure as the shops and storeroom. These continue in use without major alterations.

The officers of the Marquette Cement Manufacturing Company are: W. A. Wecker, president and treasurer; W. W. Dickinson, vice-president; D. S. Colburn, vice-president; R. Moyle, Sr., vice-president in charge of operations; V. J. Hanley, secretary.

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Wage Increase Allowed Mineral-Wool Workers

A general wage increase of 7.2 cents an hour was awarded June 20 by the National War Labor Board to approximately 350 employees of the Johns-Manville Company mineral-wool plant at Alexandria, Indiana. The board found the approved increase to be within the amount allowable under the "Little Steel" formula.

The board denied a request by the United Stone & Allied Products Workers, CIO, representing the employees, for an increase in the basic hourly wage from 60 cents to 65 cents an hour. The board held, with labor members dissenting, that it was not permissible under the wage policy set forth in the "Hold-the-Line" Executive Order 9328 and the supplemental directive of May 12, 1943.

The average hourly earnings for these workers in January, 1941 were 68.3 cents. One general increase of 3 cents an hour has been granted since that time, leaving 7.2 cents to total the 15 per cent. allowable under the board's cost-of-living adjustment formula.

The increases are retroactive to November 3, 1942.

The board's decision on union security and the check-off were announced earlier. Industry members dissented from the board's grant of these two contract provisions.

The increases approved by the board are subject to approval by the Director of Economic Stabilization.

Phosphate-Rock Output Gaining in Far West

Production of phosphate rock from the great reserves in the western states has been steadily increasing in recent years. The quantity sold or used annually has about doubled in the last five years, reaching a record total of 265,665 long tons in 1942, as reported by the producers to the Bureau of Mines. This was more than 60,000 tons greater than in 1941, and with a value exceeding $1,000,000 for the first time. The production in 1942 came from Idaho, Montana and Utah, as in 1941.

Cement Far Superior to That of 33 Years Ago

Portland cements today, even those of the moderate-heat type, are capable of giving concrete strengths in one month equal to those for a 1910 cement at 10 years, and present-day early-strength cements may give strengths at one month exceeding the 10-year strengths, according to Louis Shuman of the Bureau of Standards.

As analyzed in *Highway Research Abstracts*, Mr. Shuman's study gives information on 10-year compressive-strength tests made with 12 early-strength cements. The concretes were of three different cement-water ratios, five initial temperature conditions and four curing conditions.

The concretes stored in damp air generally continued to gain strength up to 10 years. Concretes stored in the air of the laboratory had about the same strengths at 10 years as at 28 days. The strengths at ages after 28 days were not appreciably affected by the initial temperatures, which varied from 70 to 110 degrees F. The usual variation in strength with cement-water ratio, however, persisted up to 10 years.

For damp-cured 1:2:4 concrete with a water-cement ratio of 1.5 the compressive strengths at 10 years were generally between 4,000 and 5,000 lb. p. s. i. For concrete of the same proportions and a cement-water ratio of 1.73, strengths of more than 6,000 lb. p. s. i. were attained for eight of the 12 cements.

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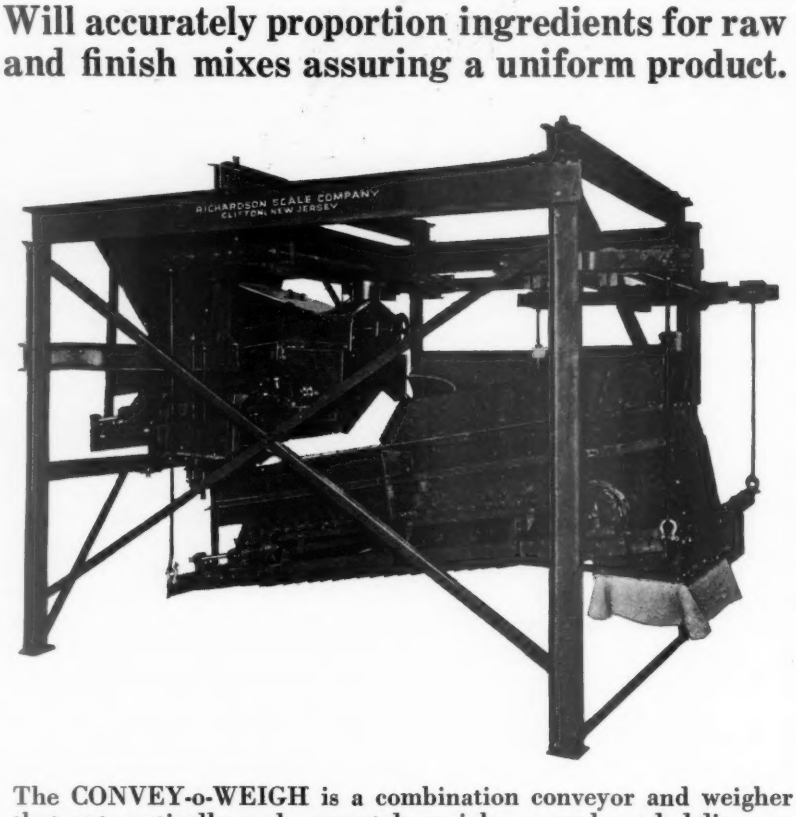

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How to Make Your Accidents Teach Safety

By A. J. R. CURTIS

Secretary, Committee on Accident Prevention and Insurance, Portland Cement Association

IF MY recollection is correct, the statement has been made in past regional safety meetings of the cement plants that about all that is of value that anyone can get out of an accident is experience in how to avoid similar mishaps in the future. Everything else that results from an accident is dead loss. It is worse than foolish to consider that the prime reason for investigating an accident is to fix the blame on someone. It is the cause of the mishaps that should always be sought.

Any industrial organization that does not make every effort to discover and drive home the lessons that can and should be salvaged from the accidents that occur is passing up one of its most valuable opportunities. Furthermore, when a plant receives reports of accidents suffered in other plants of similar process and set-up, it should be assumed that they are just about as important a source of information as the reports of its own misfortunes and every effort should be made to get the real safety lessons out of them.

Considering this matter of learning from our own mistakes and from the mistakes of others, most people will agree that what is needed first of all is a clear, frank, accurate and complete report of the accident in each case. That is fundamental. So I would like to advocate that whenever anyone at your plant has before him the painful duty of preparing an accident report, he makes mighty sure that his report contains all the desirable elements just mentioned. In addition it should be carefully written and if necessary rewritten to get vividness of expression, good style and completeness into it without sacrificing the cardinal virtue of brevity.

To do a really good job of accident investigating and reporting one must be painstaking and thorough; he must know the men, the process and the equipment and he must have imagination. He must also possess a passionate desire to uncover the true facts — not the imagined facts — without either fear or favor. If you do not feel that you are gifted along these lines, the study and reporting of accidents will help you develop aptitude. Accident reporting and the reports themselves teach all who really care to learn. Anyone who gets into such a job in earnest will discover that he improves as he goes along.

Some foremen and safety men are not careful enough to dramatize accident reports in presenting and discussing them with the men of the organization. A foreman in one of the eastern mills who has thought a great deal about this matter follows the practice of preparing himself quite fully before he talks about an accident to the men under his supervision. He says he never felt that he got much of the information across until he made up his mind to know as much as possible about each accident before he attempted to explain it to others.

I agree with him. That observation merely follows the generally known fact that the more a man knows about a subject, the more he can impart to others. Men probably fail more often as teachers because of their lack of information on the subject than because they are badly deficient in the art of teaching.

When a foreman has been able to completely visualize an accident to himself, he is in a much better position to paint a vivid word picture of the circumstances, the causes and the consequences in speaking to the men of his force. If he can tell the story as a story ought always to be told, in clear, concise and interesting form, it will register in the minds of his men. The teller usually gets across only as much as he tells clearly and men lose interest and let their minds wander if the speaker goes all around Robin Hood's barn to deliver what he could say interestingly in a few words.

After a foreman discusses an accident with his men he ought to post the report where the men can go over and read it for themselves. Copies posted for this purpose should be clear enough to invite reading and illustrated where possible with ample sketches or photos.

It pays to keep in mind the fellows who can not see or read too well. In a certain plant such reports were posted in a location that made reading almost impossible for men with bifocal glasses. The board was too distant to be seen well with the near sights and too close to be seen well with the far sights. As a result some of the men rarely knew what was on the board.

After going over an accident report carefully with his men the foreman may add great value to the procedure by inquiring of the men individuallv whether the accident being considered could possibly occur in their department or to any man they can think of. If anyone feels such an accident is possible, the question should then be raised as to how it may be made impossible. Every effort should be made to find the solution, then act upon it promptly.

My closing suggestion is this: Never let the report of an accident get tucked away in your files until you have extracted from it every possible thought and suggestion that might help prevent repetition of the mishap.

Jack Dempster, dynamic safety director of the Canada Cement Company, recently said: "A great deal of the sting and bad effect of an accident may be removed if there is a vital lesson learned, for one man's ship may strike a hidden rock and his cargo be lost, but if a lighthouse is subsequently erected on that rock, many ships move in and out with perfect safety."

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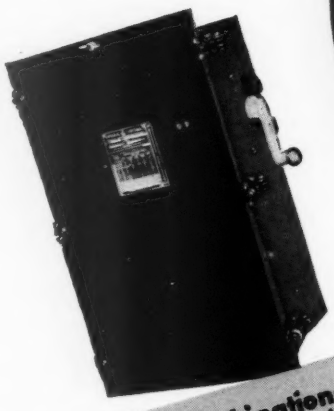

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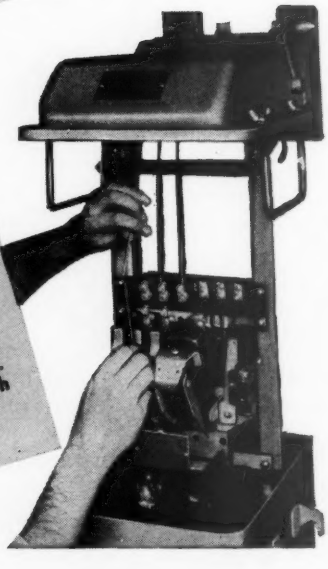

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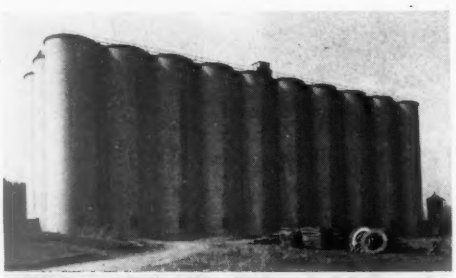

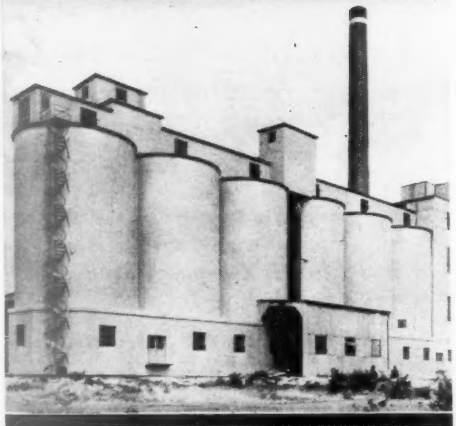

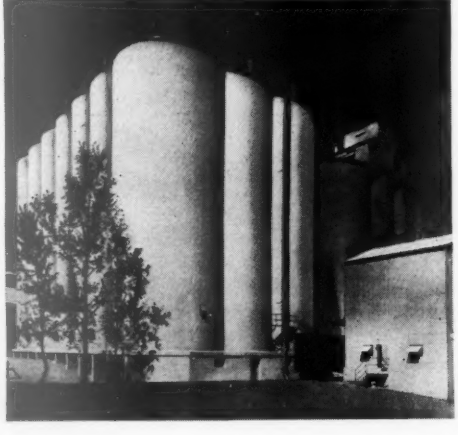

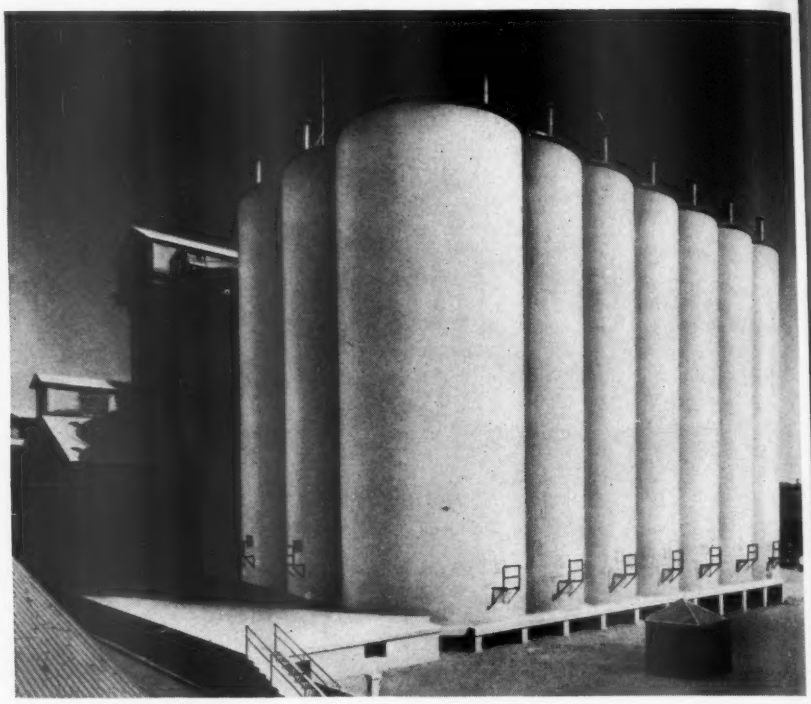

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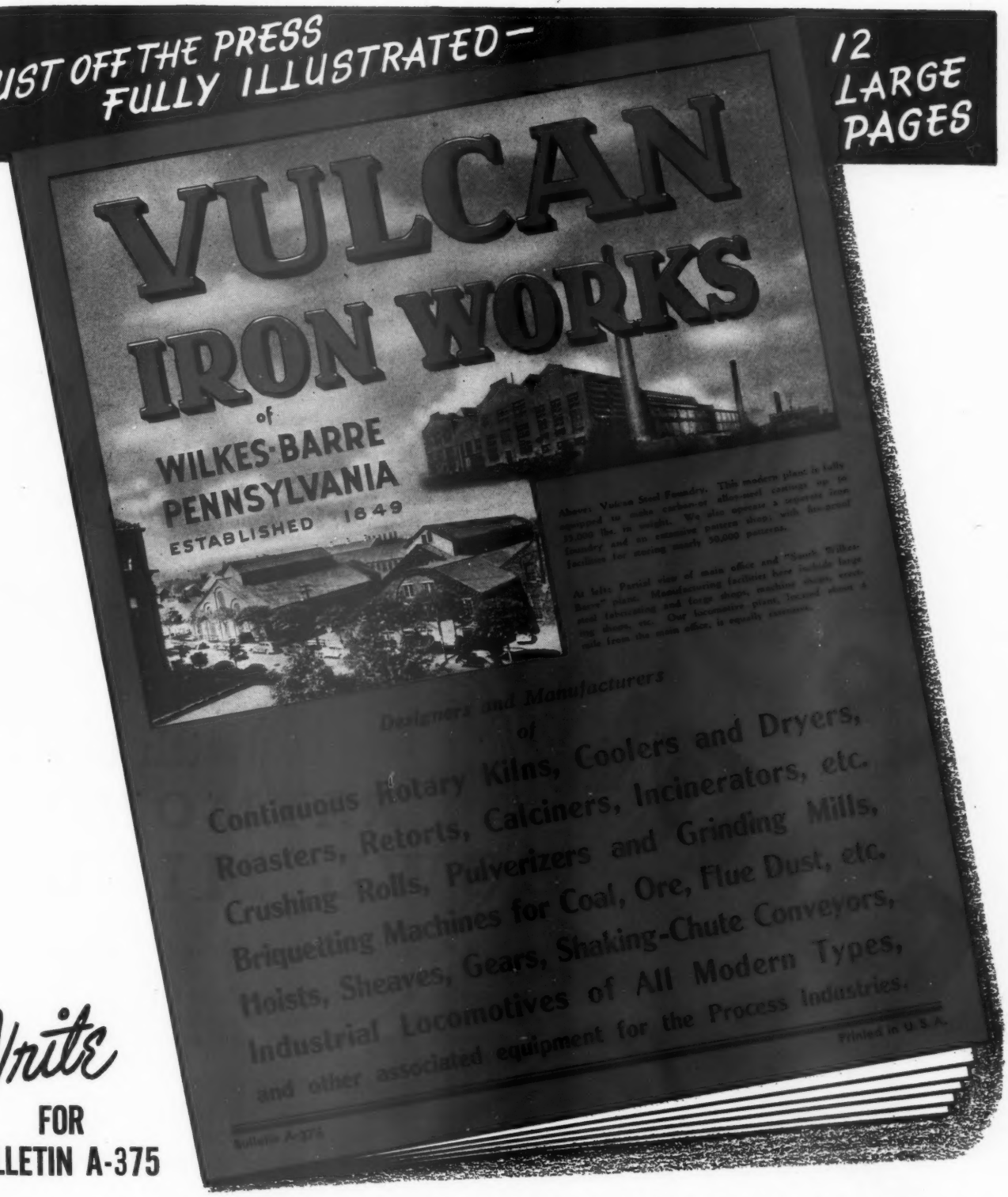

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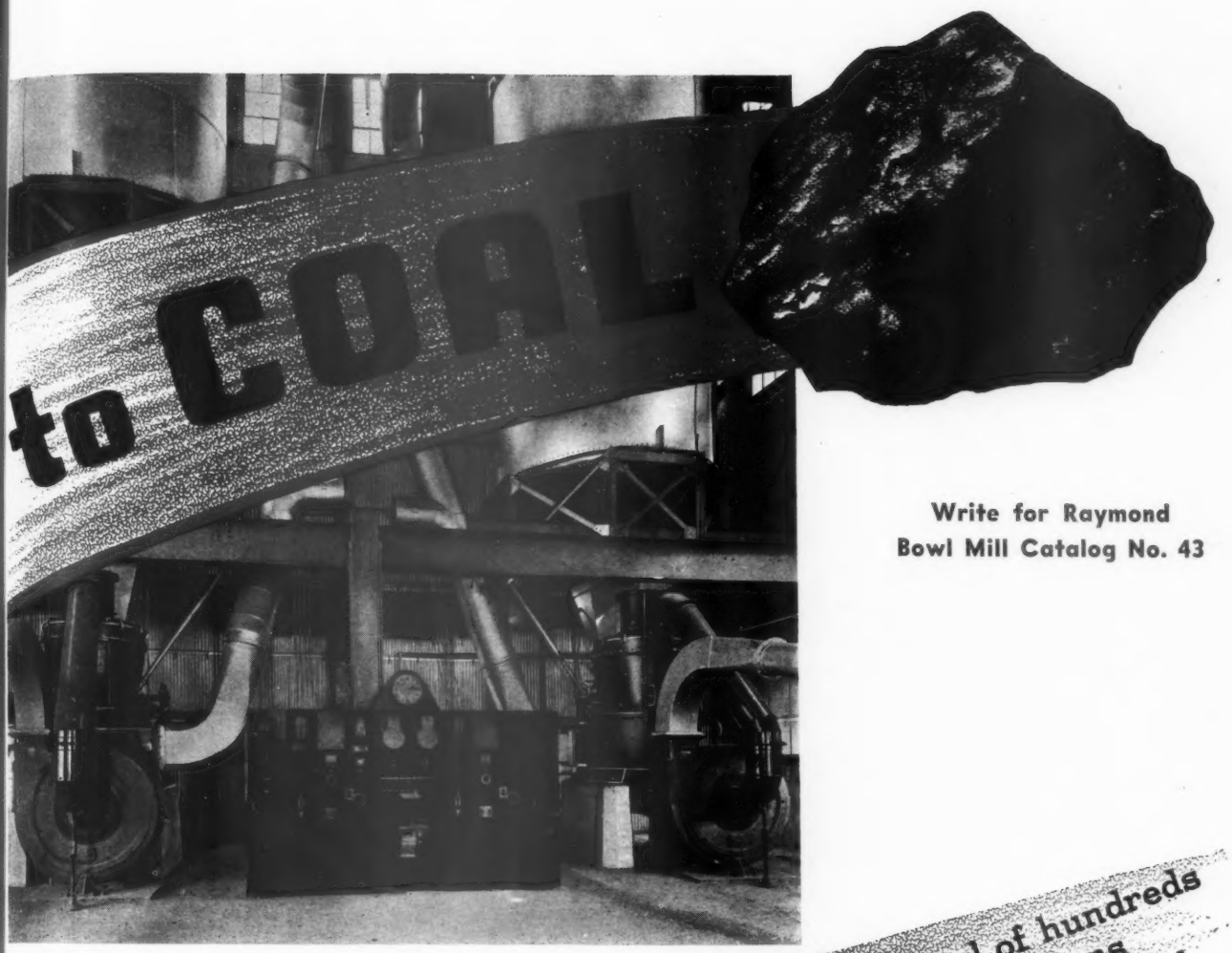

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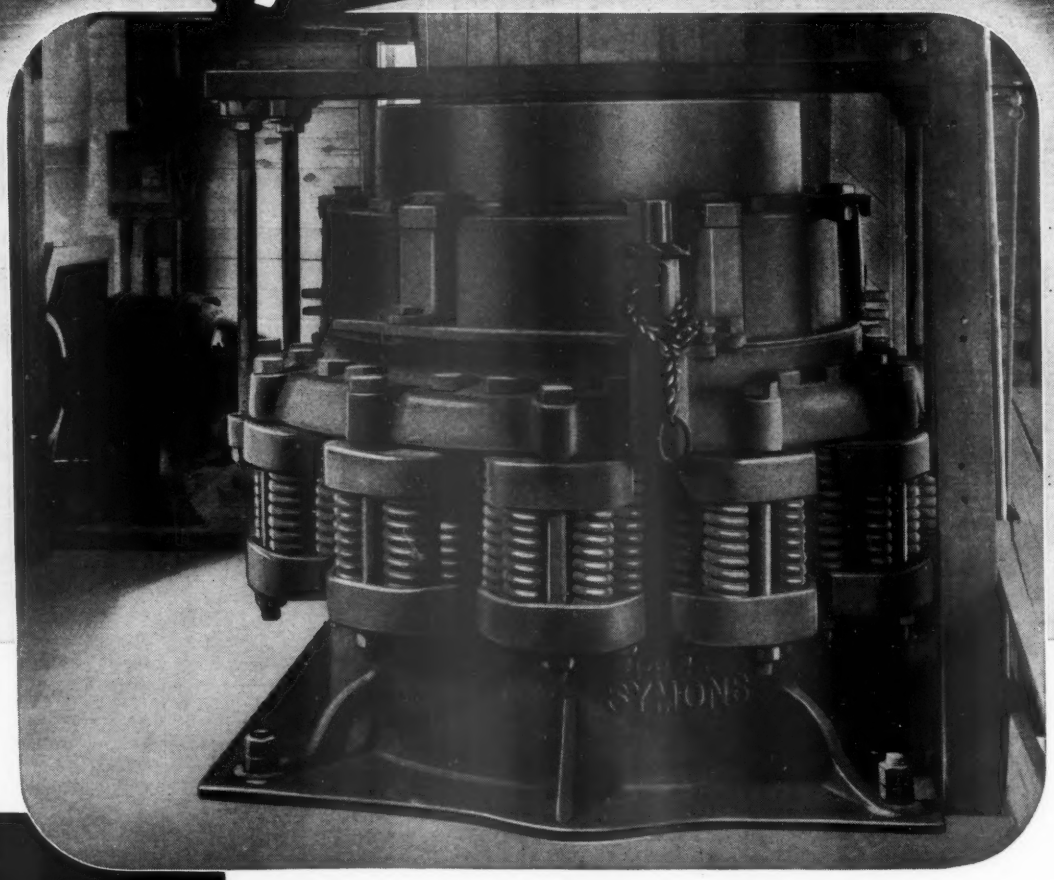

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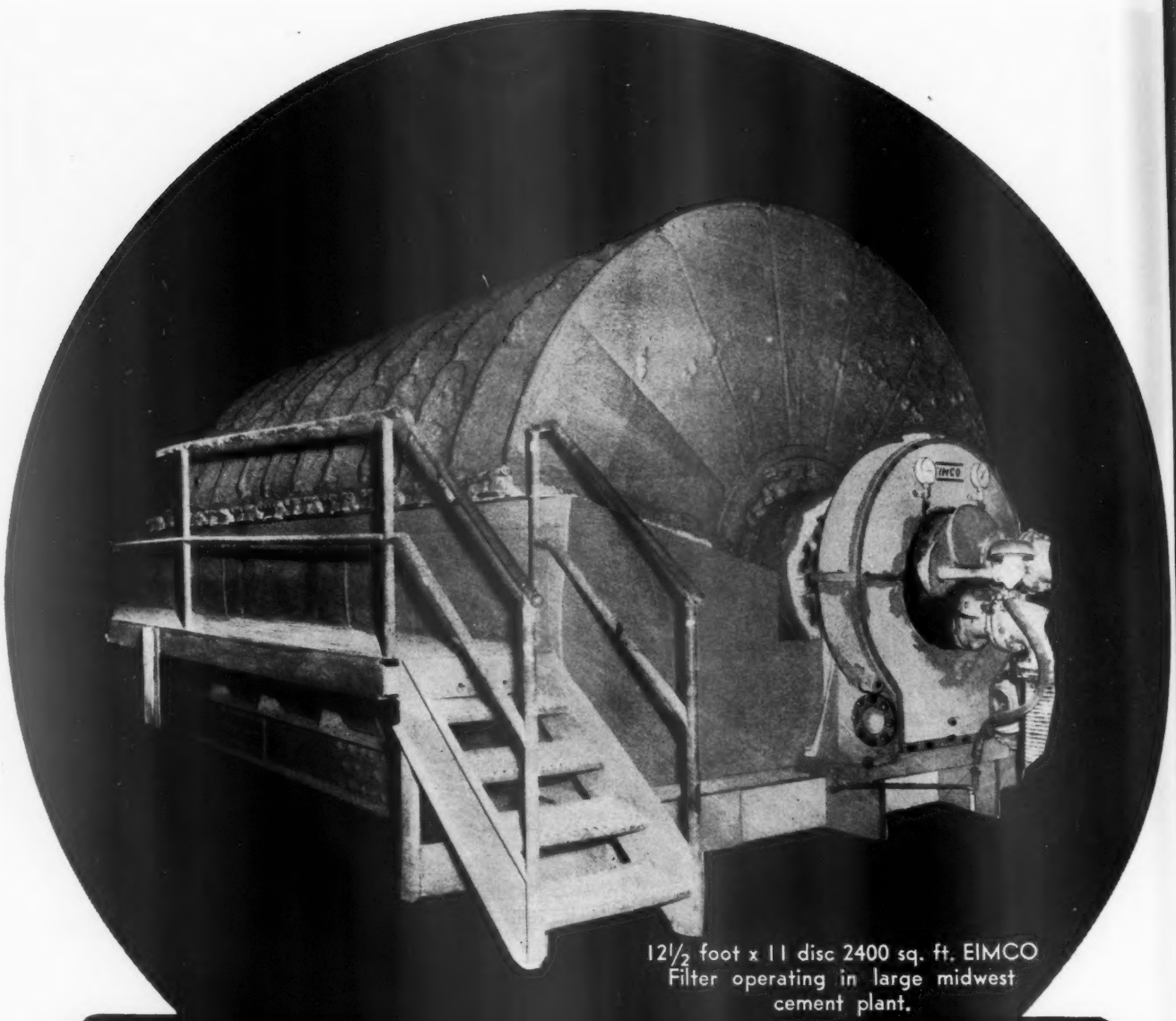
Baltimore, Md. Birmingham, Ala. Dallas, Tex. Denver, Colo. Franklin, Va. Los Angeles, Calif. Nazareth, Pa. New Orleans, La. San Francisco, Calif. Seattle, Wash. Toledo, Ohio



12½ foot x 11 disc 2400 sq. ft. EIMCO Filter operating in large midwest cement plant.

Eimco Slurry Filters

Eimco Cement-Slurry Filters are designed, engineered and built according to the specific requirements of each job. With Eimco Custom-Built filters in the plant you are assured the following advantages:

1. Low coal consumption per barrel of clinker produced.
2. An increase in the capacity of each kiln fed through Eimco Slurry Filters.
3. Waste heat boiler efficiency will be increased.
4. Grindability of raw material will be increased.
5. A more accurate control of raw material uniformity (composition).

Write your nearest Eimco office for detailed information or call in an Eimco Engineer for consultation. You will be under no obligation.

THE EIMCO CORPORATION

SALT LAKE CITY, UTAH, U.S.A.

NEW YORK	CHICAGO	EL PASO	SACRAMENTO
120 Broadway	111 W. Washington St.	Mills Bldg.	1217 7th St.

HUNDREDS of CEMENT PRODUCERS Can't be Wrong!

STURTEVANTS must be right—in design, construction and performance—as attested by the installation of Hundreds of STURTEVANT Separators in the cement industry alone—All Sold on Approval—not a single rejection.

Here are a few of the convincing reasons why recruits are constantly being added to the STURTEVANT corps of satisfied customers:—

- **Fineness range**
- **Positive control**
- **Capacities from ¼ to 50 tons per hour**
- **Increased mill output as high as 300%**
- **Particle uniformity**
- **Lowered mill temperatures**

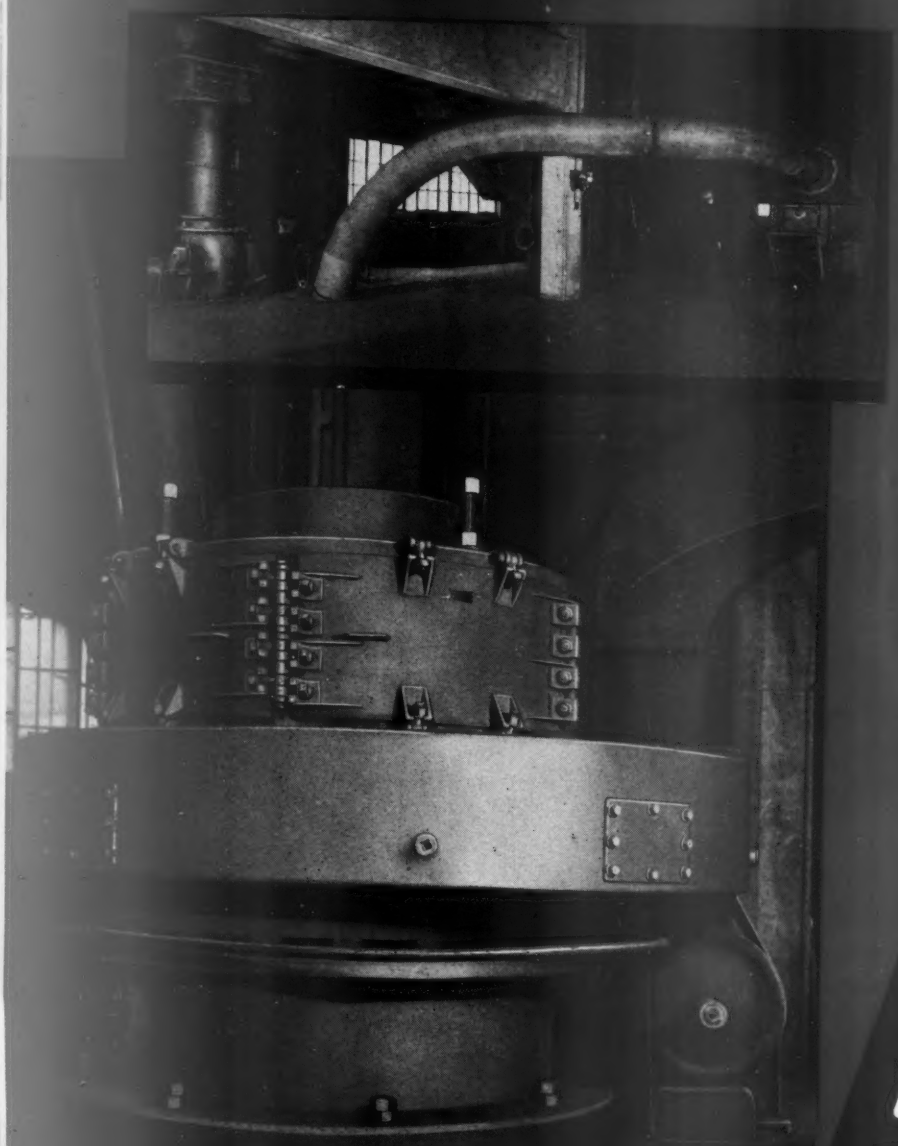
Write for Information

STURTEVANT MILL CO.

Harrison Square, Boston, Mass.

World's Largest Direct-Fired Cement Kiln

served by a B&W Type E PULVERIZER



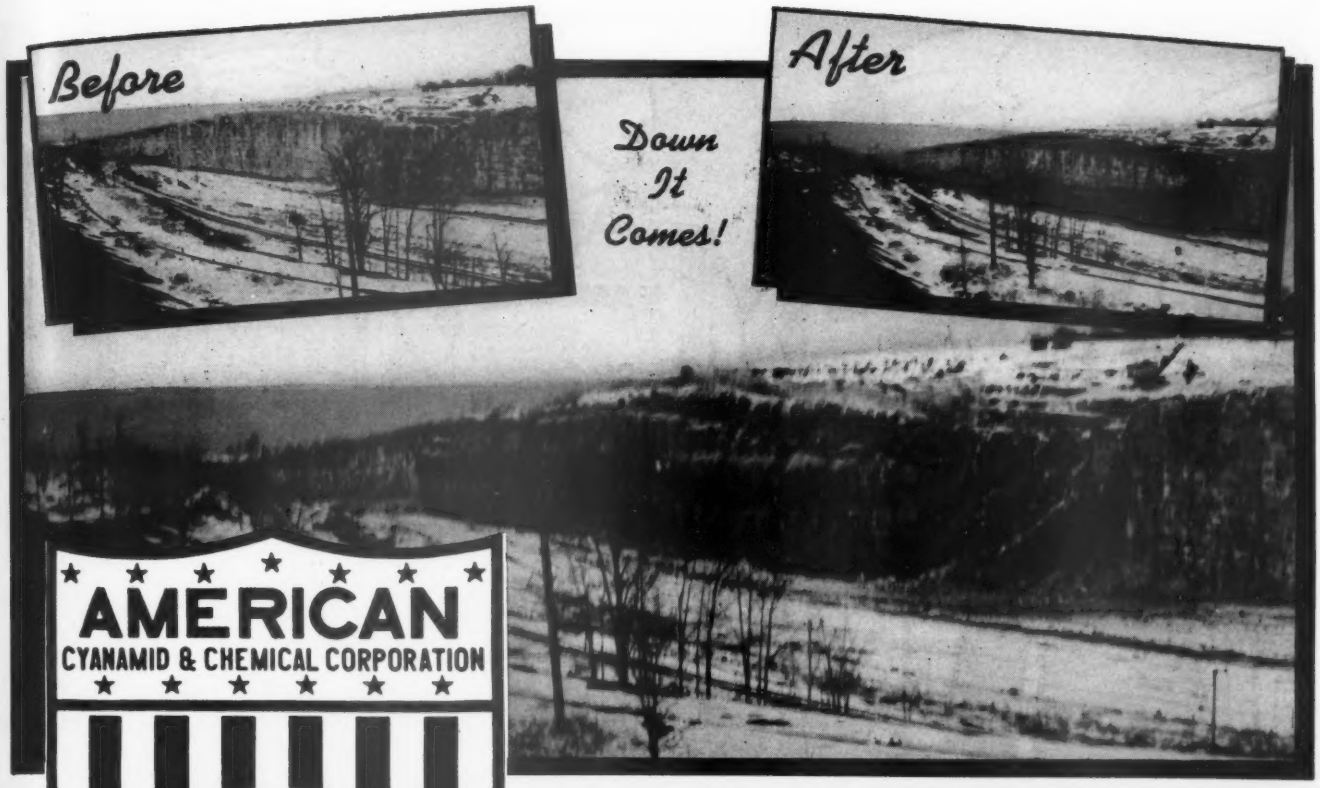
This pulverizer, at the plant of Marquette Cement Mfg. Co., Des Moines, Iowa, is the largest direct-firing pulverizer so far installed in a cement plant.

The kiln is 11 ft. 6 in. by 475 ft. (wet process); output averages approximately 3200 bbl. per day. Approximately 8 tons of Iowa coal are pulverized every hour, moisture in the coal running as high as 20 per cent.

The small photograph shows the firing floor and entrance to the kiln.

BABCOCK & WILCOX

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK, N.Y.



AMERICAN
CYANAMID & CHEMICAL CORPORATION

EXPLOSIVES

HOW TO BRING DOWN TONS . . .

❶ Plan your shots carefully
❷ Use the correct explosives

THESE "step-shot" photos show approximately 335,000 tons of limestone being brought down by 90,000 pounds of dynamite. Two blasts were made on successive days using 187,000 pounds of dynamite to produce about 700,000 tons of rock.

The usual problem — to bring this material down in the proper shape for his purposes — faced the producer. Consultations between operating officials and AMERICAN field engineers on spacing, drilling, loading, and explosives led to decisions on the proper procedure.

Correct blasting practice, using the explosives best fitted for the job, brings the desired result. AMERICAN explosives are the products of intensive research, chemical control, inspection and unremitting care in manufacture.

- *Capable field engineers are available at your call.*

★ **HIGH EXPLOSIVES**

★ **PERMISSIBLES**

★ **BLASTING POWDER**

★ **BLASTING ACCESSORIES**

American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

EXPLOSIVES DEPARTMENT

SALES OFFICES: Pittsburgh, Pa. Bluefield, West Va. Scranton, Pa. St. Louis, Mo. Chicago, Ill. Pottsville, Pa. Hazleton, Pa. Maynard, Mass.

"RIGHT DRESS"

FOR CEMENT, LIME, PLASTER

☆ Hammond Multi-Wall Paper Bags provide the "RIGHT DRESS" for your products and are doing their bit to speed the day of Victory!

HAMMOND BAG & PAPER CO.

Paper Mill and Bag Factory · WELLSBURG, W. VA.

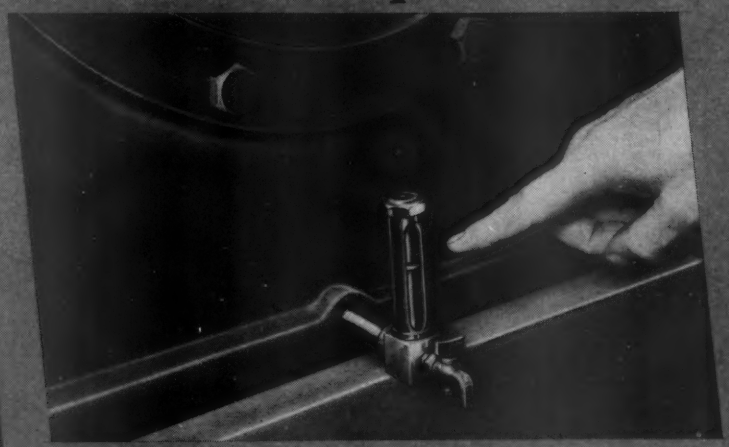
Compressors, too, are working hard these days—

PROPER LUBRICATION IS MORE IMPORTANT THAN EVER

Built into Chicago Pneumatic horizontal stationary compressors are force feed cylinder lubrication and a highly efficient flood system of frame lubrication. These lubricating systems require only minimum attention on the part of the operator —a few simple check-ups which, however, should be made regularly.

Additional suggestions for maintaining compressor efficiency will appear in future advertisements. Watch for them.

HOW TO GET MAXIMUM OPERATION FROM YOUR CP COMPRESSORS



Bearings will not run without oil. Keep oil in crank case at level indicated on oil level gauge (illustrated). Drain, clean, refill reservoir at least once a month — more frequently if local conditions require.

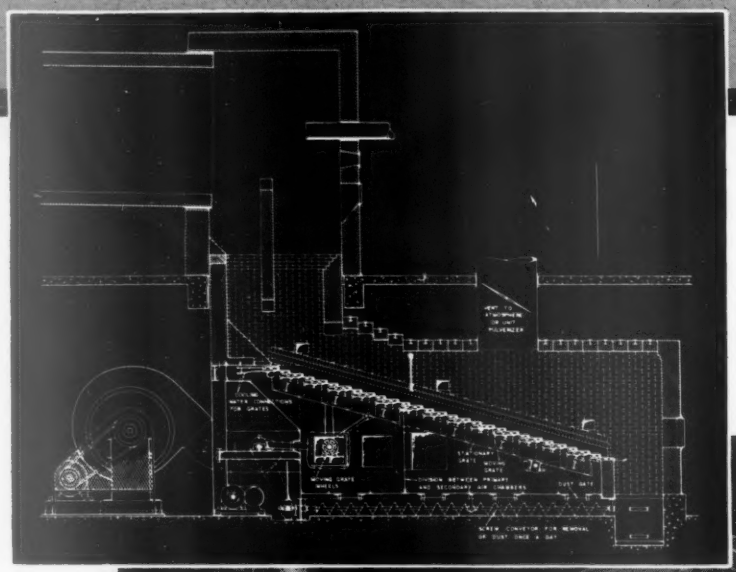
← At least once a day, check the force feed cylinder lubricator, making sure reservoir is filled to required level. Make certain that lubricator is feeding only the number of drops per minute recommended for your particular size of compressor — too much oil results in carbon formation and overheating.

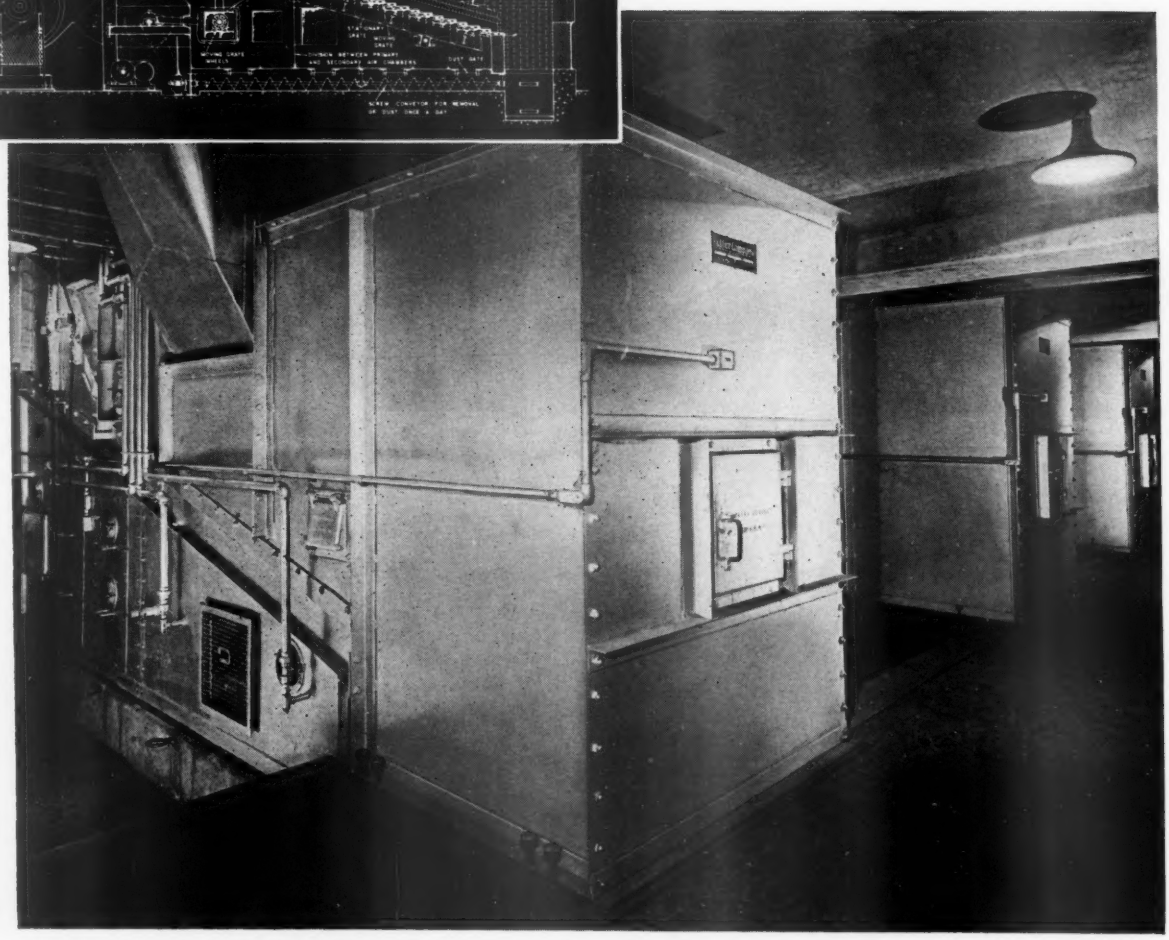
★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

MODERN





Three clinker coolers installed by a large cement company. This installation is of the combined recuperator and final cooler type, with divided chamber. Each of these coolers has a capacity of 1000 barrels a day; clinker delivered to the primary or recuperator section at approximately 2500 Deg. F., reduced in the final cooling section to approximately 200 Deg. F.

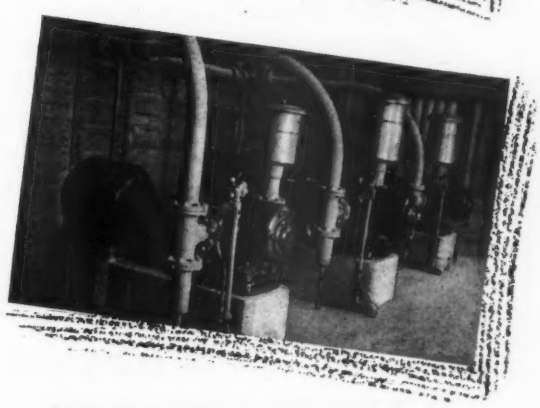
FULLER-KINYON, FULLER-FLUXO, THE AIRVEYOR CONVEYING SYSTEMS . . . ROTARY FEEDERS AND DISCHARGE GATES . . . ROTARY AIR COMPRESSORS AND VACUUM PUMPS . . . AIR-QUENCHING COOLERS . . . CEMENT COOLERS . . . BIN SIGNALS

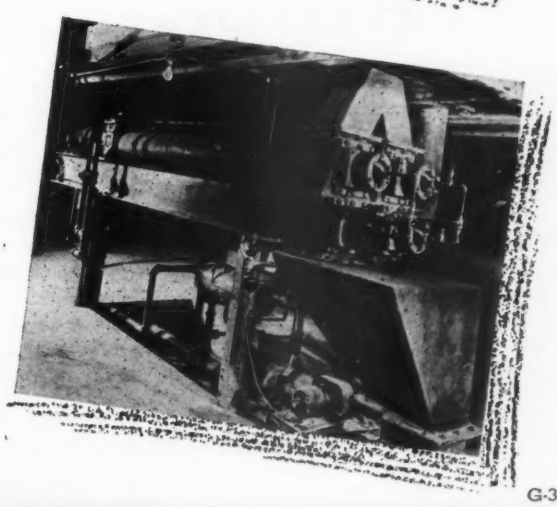
EQUIPMENT *for* MODERN CEMENT PLANTS

Since April 1, 1926, Fuller Company has served the cement industry. Starting at that time with only the Fuller-Kinyon Conveying System, used principally for conveying finished cement from pulverizers to storage and storage to packer bins, Fuller Company has developed the following products which have received universal approval by the industry.

1. ROTARY FEEDER
   For tube-mill feed, kiln feed for raw materials and pulverized coal; mixing, blending, and proportioning.
2. ROTARY GATE VALVES
   A positive open or closed valve, easily operated.
3. ROTARY COMPRESSORS AND VACUUM PUMPS
   Adopted by the industry for "spotting" units in various departments . . . air where and when needed . . . at pressures to do the work required most efficiently and economically. Some plants use Fuller Rotaries exclusively.
4. REMOTE-CONTROL UNLOADERS
   For conveying bulk cement from flat-bottom storage bins and silos to packer bins, box and hopper-bottom cars. Used extensively for unloading cement from box cars, barges, and ships.
5. MATERIAL-LEVEL INDICATORS
   For controlling high and low levels of material in bins and silos.
6. AIR-QUENCHING CLINKER COOLER
   Designed and built principally for the production of cement clinker of high glass content, to reduce delayed expansion, and obtain other advantages characteristic of high glass-content clinker with efficient recovery of heat and economical complete cooling as inherent features. A three-purpose cooler: abrupt air-quenching, heat recuperation, and final cooling.
7. FINISHED CEMENT COOLER
   For efficient cooling of cement previous to being conveyed to storage. Temperature drops ranging from 100 to 150-deg. F., depending on initial temperatures, have been obtained in actual manufacturing operation.

Fuller Company is fully prepared to assist cement manufacturers in planning to modernize and make changes in many departments, such as installation of Air-Quenching Clinker Coolers, Cement Coolers, Rotary Compressors and Vacuum Pumps, etc. Make your plans now; be ready to act at the first opportunity. Fuller engineers will be glad to discuss the economic application of Fuller equipment in your plant.





G-34T

FULLER COMPANY

CATASAUQUA — PENNSYLVANIA

CHICAGO
Marquette Bldg.

WASHINGTON, D. C.
Colorado Bldg.

SAN FRANCISCO
Chancery Bldg.

THIS is 1943

A year so different for all of us. A change in our mode of living ...in habits...in life-long customs. Changes around us every day.

Ration coupons, not dollars, now buy the steak, butter, sugar, coffee, shoes, gasoline, oil, and other items on an ever-rapidly mounting list.

Industry and manufacturing have their alphabetical program to follow. It's a far cry from our former methods to the way business is conducted in 1943.

INDUSTRIAL RUBBER PRODUCTS

The Rubber Industry has been forced to make many changes . . . its achievements under the tremendous load of responsibilities to the War conditions have been marvelous and ranks high with the progress made by any Industry.

When the call came, for not thousands but millions, of feet of hose; tons of packing; unbelievable quantities of belting; the Industry met the job courageously, and supplied the desires of Uncle Sam, unequalled by any other Industry.

Yes, the Rubber Industry is functioning 100% in the desire to win the War at the earliest possible moment to permit our activities to be centered on peacetime endeavors.

QUAKER

is playing an important part to

GOVERNMENT • WAR PLANTS • INDUSTRY

Quaker has been right in step with these changing conditions. Long before our entry into the War, Quaker was called upon to supply for our Government large quantities of Belting, Hose and Packings, and, in addition, the demands of the Defense Plants also had to be met.

With these conditions, it is only natural that sufficient volume would not be available for all demands made by civilians. Logically, orders for Government and Plants on War Work get the right of way at Quaker.

But Quaker is proud of the part we have been able to take in keeping Industrial Rubber Goods flowing through the normal sources of supply.

REG. U.S. PAT. OFF.

Quaker did not build its business to its present size by making rash promises. We are not ashamed of our record being made during these critical days. Every day many vexing problems arise that need a solution. For the future, we promise to do everything humanly possible to keep a flow of Industrial Rubber Products going to the many places where rubber is a necessity.

Quaker keeps well informed on all Government regulations . . . has at least one Quaker representative in Washington constantly, others as occasion warrants. You are cordially invited to consult Quaker whenever Industrial Rubber Goods are involved. If there is a way to get it done, Quaker will do it.

QUAKER—58 years of Quality Industrial Rubber Products

Buy More War Bonds and Stamps

QUAKER RUBBER CORPORATION

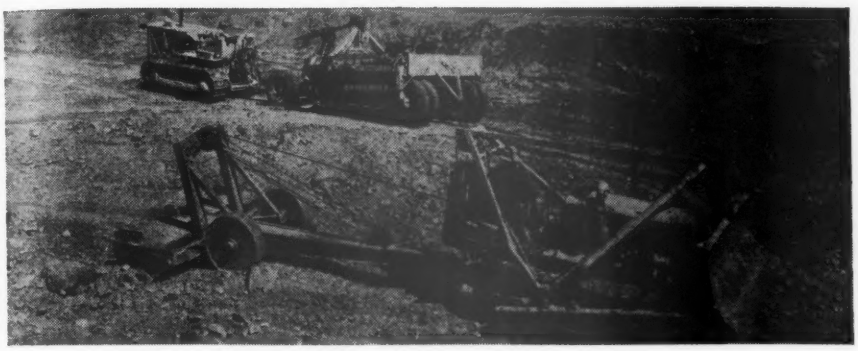
OVER 58 YEARS CONSISTENT QUALITY

PHILADELPHIA • *NEW YORK* • *CHICAGO* • *HOUSTON*

Western Territory

QUAKER PACIFIC RUBBER COMPANY • SAN FRANCISCO • LOS ANGELES

HOW YOU CAN
Strip Bigger Yardages
and Conserve Tractor Power



(Below left) LeTourneau Heavy-Duty Rooter saved blasting in cemented gravel on this Hereford, Oregon, stripping job . . . enabled Relyea & Sons' veteran 12-yard Carryall to profitably strip this hard material. Dozer on Rooter tractor handled short haul stripping and pit clean-up.

Use LeTourneau Dozer-Rooter-Carryall Combination

Like many other successful pit and quarry operators, you'll find you can use LeTourneau Dozers and Rooters in combination to:

Increase Tractor Usefulness— Like all LeTourneau tools, Rooters and Dozers are cable controlled; both can be operated from the same 2-drum LeTourneau Power Control Unit. Thus, the Dozer tractor you use for clearing, pioneering and roadbuilding can be used with a Rooter to break up stripping areas, too hard to pioneer with Scrapers alone.

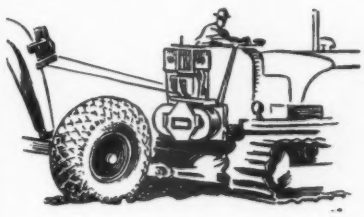
Save Blasting—In hard materials, such as decomposed shale, granite, cemented gravel, hardpan—anything short of solid rock—rugged LeTourneau Rooters give you complete breakage for low-cost Scraper loading . . . save the time, expense and danger of blasting.

Strip Big Yardages Faster—Rooting cuts Scraper loading time and enables Scrapers to get bigger loads quicker in hard, rocky material . . . same time extends the profitable use of your Scrapers to materials formerly considered truck and shovel work.

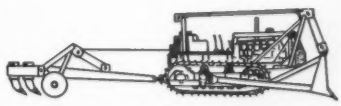
Quickly Interchangeable—With only one tractor, you can quickly and easily change from Dozer-Rooter to LeTourneau Carryall Scraper on the same tractor and 2-drum Power Unit. In fleet operation, a Rooter will break up enough to keep several Scrapers in easy digging; same time, the Dozer on the same tractor can be used for pusher loading to further cut Scraper loading time and increase yardage stripped.

Time-Saving Service—On your toughest mining jobs, rugged, long-lived construction keeps LeTourneau equipment working with a minimum of time out for repairs. Most repairs can be made in the field by welding; parts and service are available from LeTourneau-"Caterpillar" dealers in all Allied countries.

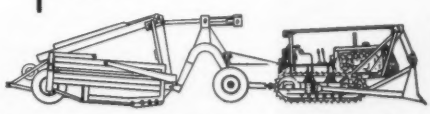
LeTourneau Power Control Units Enable You to Get Greater Use From Your Tractor Power



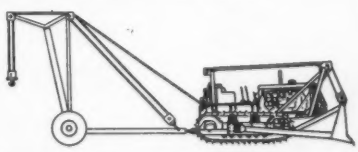
All LeTourneau tools are controlled by fast-acting cable operating through a Power Control Unit mounted on the tractor. LeTourneau Power Control Units enable one man to operate both tractor and equipment from the tractor seat. They make it possible, too, for you to change your tractor from one tool to another to meet changing job requirements—see illustrations below for some of combinations.



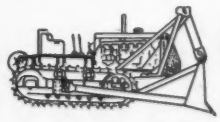
Both Dozer and Rooter can be operated from 2-drum, rear-mounted PCU.



Here Carryall Scraper is controlled through 2-drum, rear-mounted PCU, Dozer from front-end PCU.



Crane operates from 2-drum, rear PCU, Dozer from front-end unit in this combination.



Here front-end PCU operates Dozer, thus leaves rear of tractor free for mounting heavy-duty winch.

(Left) Pusher loading downgrade enabled this LeTourneau 23-yard Carryall to get capacity loads fast. After loading, one "Caterpillar" D8 tractor, provides ample power to haul and spread the big loads.

THEY KNOW THEIR BUSINESS

Operating a carrier and producing industrial friction materials have nothing in common except this: it takes "know-how" to do either job right.

38 years experience has given Raybestos the essential "know-how". Raybestos means: 1) *correct* and *dependable* brake linings and frictions, *specially engineered* to meet the *exact* requirements of every machine that you operate; 2) friction materials that actually improve the original performance of older industrial equipment; 3) a single source of supply for all your needs; 4) fastest deliveries through your local Raybestos distributor.

Specify Raybestos — *now.*

THE RAYBESTOS DIVISION *of Raybestos-Manhattan, Inc.*, BRIDGEPORT, CONN.

RAYBESTOS IS AMERICA'S BIGGEST SELLING BRAKE LINING

Raybestos INDUSTRIAL FRICTION MATERIALS

FOR SHOVELS • CRANES • HOISTS • TRACTORS & EARTH MOVERS

AMERICAN SLURRY FILTER

12 ft., 6 in. diameter x 12 disc double American Filter (24 discs) having 4800 sq. ft. of filter area . . . the largest cement slurry filter ever built.

3
recently installed in a well-known cement plant on the coast
106
in other wet process cement plants within Continental United States
28
in wet process plants outside the United States

These figures imply that the American Continuous Filter is the most "experienced" unit available for dewatering such cement making materials as limestone, shale, clay, slag, marl, chalk and cement rock. You can find it in many mills in the United States; also in England, France, South Africa, New Zealand, Argentina and other countries.

They also imply rather strongly that Oliver United engineers, who back in 1925 made the first practical installation of continuous slurry filters in a Michigan plant, are thoroughly conversant with the subject. They also imply that Oliver United has available operating records which would be helpful in applying it to other wet process plants or to dry plants planning to shift over.

And they suggest that other plants not now equipped with American Slurry Filters should change over in order to cut fuel costs, improve kiln operation, and reduce kiln maintenance.

OLIVER UNITED FILTERS INC.

New York 18, N. Y. 33 West 42nd Street
San Francisco 11, California
Chicago 1, Ill. 221 N. La Salle Street
Western Sales Division Oakland 1, California 2900 Glascock Street

Factories: Oakland, Calif. — Hazleton, Pa. — Orillia, Ont., Canada — Melbourne, Australia

DRILLING *to take out the toe!*

Drilling a snake hole with the DR30

CLEVELAND DR30 Wagon Drills, in addition to having plenty of speed and stamina, are also remarkably maneuverable. They drill readily in any position and at any angle—straight down, flat, breast high, higher than your head, or within 4″ of ground level—even straight up when necessary.

The DR30 has a recoil device to increase cutting speed. The forward leg point steadies the drill. Other important features include a handy centralizer to keep the steel from "walking" while starting a hole. Also a double-screw jack for moving the U-bar. With a feed capacity of more than 8 feet, the DR30 handles depths to 25 feet and more.

Bulletin 132, sent upon request, explains why the DR30 is the most popular wagon drill ever built.

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	New York, N. Y.	

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Whitehall Machine & Tools, Ltd., Galt, Ontario

BUY U. S. WAR BONDS AND STAMPS

THE CLEVELAND ROCK DRILL COMPANY

Division of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

LEADERS IN DRILLING EQUIPMENT

SCANDINAVIA AND FENTONIA
CONVEYOR BELTING
SOLID WOVEN — NO PLIES

SCANDILEX & SCANDINAVIA FOR TRANSMISSION

156 FEET OF 30"—No. 5 FENTONIA CONVEYING STONE FROM THREE DRYERS IN A CEMENT PLANT.

•

"SCANDILEX" and "SCANDINAVIA" TRANSMISSION BELTING

•

Used extensively on Kiln, Feed, Dryer and General Drives in CEMENT PLANTS.

•

"SCANDINAVIA" and "FENTONIA" CONVEYOR BELTS are solid woven cotton belts of excellent quality, made in thicknesses to compare with rubber of various plies.

For *heavy materials*, such as stone, rock, dry coal, cement, etc., belts are treated with special compounds according to condition of material.

Reinforced edges furnished at slight extra cost.

Where conditions are suitable, they will show economy over competitive belts.

INDUSTRIAL BRAKE LININGS

SCANDINAVIA TFN and ZT Heavy Duty Brake Lining—SCANDINAVIA INDUSTRIAL MOLDED in rolls and segments.

Note: For further informaton, send for FREE copy of "BELTING WISDOM", a reference book containing technical data on transmission and conveyor belting.

SCANDINAVIA BELTING COMPANY

250 CENTRAL AVENUE • NEWARK, N. J.

PLANT: CHARLOTTE, N. C. • BRANCHES: BOSTON, MASS., CLEVELAND, O., PITTSBURGH, PA.

The SPEARHEAD of
Air Separation
in the Cement Industry

Range from 60 to 400 mesh

Increases capacity 25 to 40%

GAYCO

Today's cement producers rely on the new model GAYCO Centrifugal Air Separator to check rising production costs.

The exclusive GAYCO adjustable centrifugal sizing fan for rejecting coarse particles assures a uniform material meeting strict specifications.

The new model GAYCO gives greater capacity, cleaner tailings and higher efficiency. It shows the lowest operating and maintenance charges recorded in years.

GAYCO is the logical choice for classifying practically all dry fine materials, and is the *first* choice of a rapidly growing army of cement operators.

We also manufacture "Reliance" Crushers, Screens, Elevators, Conveyors, Bin Gates, Grizzlies. Complete crushing, screening and washing plants for crushed stone, sand and gravel.

Write for our "tell-all" Catalog.

Universal Road Machinery Co.

RUBERT M. GAY—DIVISION
117 LIBERTY STREET
NEW YORK, N. Y., U. S. A.

FACTORY & LABORATORY, KINGSTON, N. Y.

Pit and Quarry Helps You Operate More Profitably

Every issue of PIT AND QUARRY is full of information you can use in your business. It gives you practical ideas on every phase of your operations.

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TROJAN
HIGH EXPLOSIVES

NITROSTARCH BASE

FOR

MINING, QUARRYING AND CONSTRUCTION PURPOSES

All organizations who have received the coveted "E" of the Army and Navy fully recognize that such awards carry with them not honor alone, but also grave responsibility.

Ever since the inception of our organization we have fully recognized our responsibility to the trade and have always endeavored to produce and market an explosive which represents the highest energy value for each dollar invested.

In addition to this all types and strengths of Trojan Explosives will resist or pass the impact test of a high powered rifle bullet.

They also will not produce the well known powder headache either from handling or from breathing the fumes from muck piles.

They will not freeze at any temperature encountered on this planet, neither will they leak when subjected to the most severe tropical temperatures.

1905 — EXPLOSIVES TROJAN CHEMICALS — 1943

MANUFACTURED BY

TROJAN POWDER COMPANY

ONE OF THE OLDEST MANUFACTURERS OF HIGH EXPLOSIVES IN AMERICA

PLANTS

SEIPLE, PA. ROBERT, CAL.

MAGAZINES STRATEGICALLY LOCATED THROUGHOUT THE UNITED STATES

OFFICES

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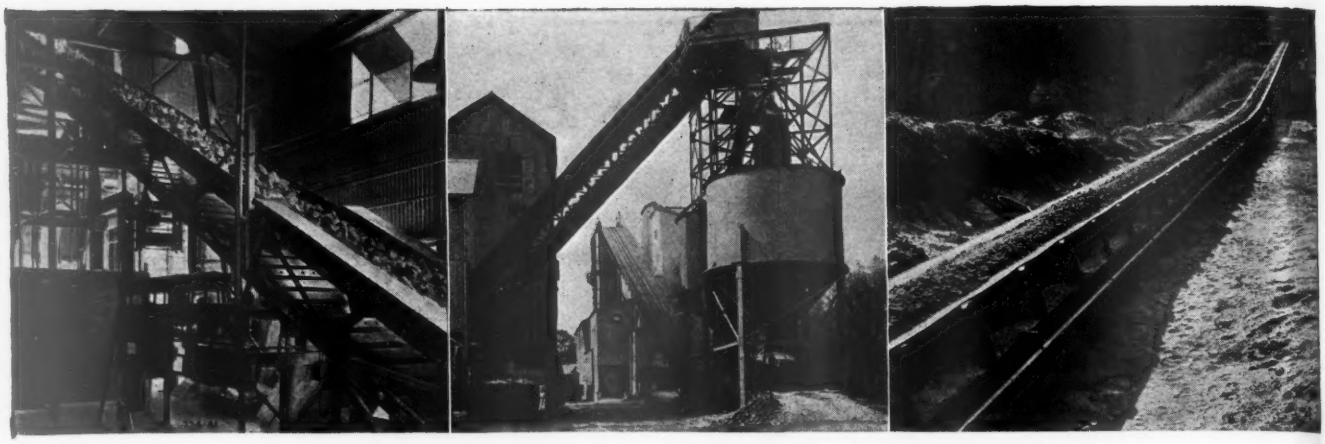

Jeffrey

Chains
Car Pullers
Conveyors
Crushers
Elevators
Feeders
Grinders
Idlers (belt)
Pulverizers
Portables
Screens
Transmission Machinery
Weigh feeders

COVERS EVERY PHASE OF MATERIAL HANDLING — REDUCTION

Jeffrey offers a broad service to the stone products industry. The name stands for mechanical efficiency and the more difficult and varied the job, the greater the need for the diversified line of Jeffrey material handling and reduction units, capable of carrying through every step of the process.

The Jeffrey Manufacturing Company

(Established in 1877)

917-99 North Fourth Street, Columbus, Ohio

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NEW YORK
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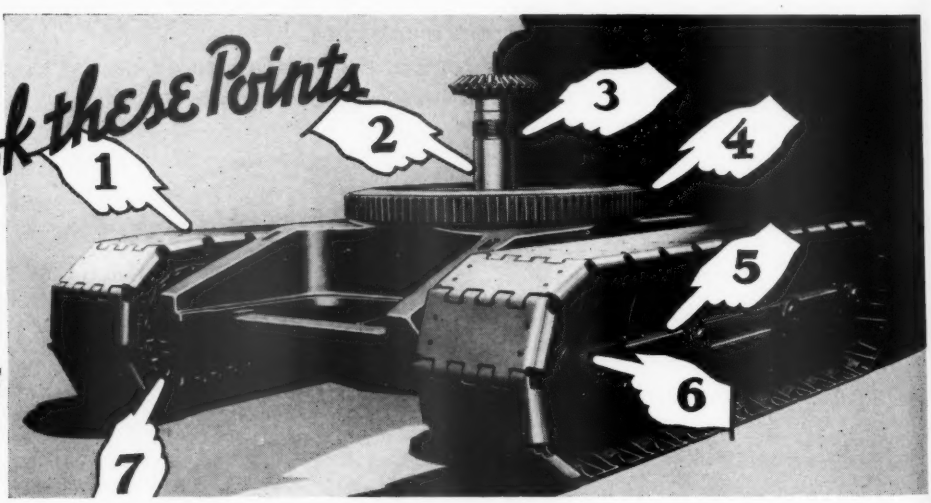
SALT LAKE CITY
ST. LOUIS

FOR LONG PROFITABLE EXCAVATOR LIFE—

Don't overlook these Points

IN SERVICING YOUR SHOVEL, DRAGLINE OR CRANE



1. Maintain uniform tension on both tracks. Crawler belts should have a minimum of sag except in sand or gravel where more slack is desirable.

2. Lubricate center pin bushing heavily twice each shift. Clean regularly to prevent grease and dirt from collecting around adjusting nut.

3. Center pin adjustment should be carefully maintained. Clearance of rear conical rollers should not exceed 3/16" with machine handling maximum load.

4. Ring Gear—Coat teeth with gear shield regularly. Roller Path—Keep free of excess dirt and grease.

5. Track adjustment is best accomplished on level ground. After adjustment has been made, coat adjusting screws with heavy oil. Dust and dirt corrosion on adjusting screws can be prevented by wrapping them after oil has been applied.

6. Track rollers should be greased at least every eight hours when machine is in use regardless of amount of traveling done. Grease all base fittings at frequent intervals when machine is being traveled. Check grease lines to inner bearings to see that they are not loose or broken.

7. Don't lubricate chains where they come in contact with sand or dirt. Keep adjusting axles at right angles to machine base for best chain and sprocket alignment. Keep chains sufficiently tight. Axle clamps should be kept tight to avoid damage to adjusting screws.

LIMA LOCOMOTIVE WORKS, INCORPORATED

SHOVEL AND CRANE DIVISION • • • • LIMA, OHIO

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60 E. 42nd St.

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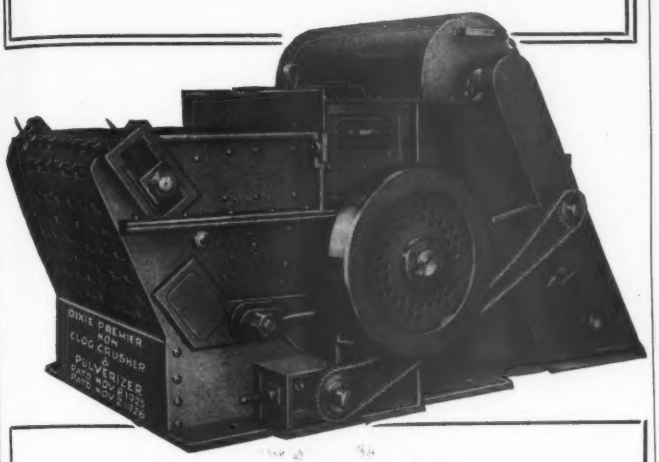
WHEN PRODUCTION CANNOT LAG

DIXIE GETS THE CALL!



DIXIE
Non-Clog
HAMMERMILLS

NOTE THESE TYPICAL TOUGH JOBS LICKED BY DIXIES

1. Replaced four crushers for high moisture content bauxite . . . cut power in half . . . reduced drying costs . . . increased production.
2. Efficiently crushing clay balls to reclaim phosphate in Florida phosphate plants.
3. Crushing phosphate muck in T.V.A. Tennessee plant.

HERE'S WHY . . .

The Dixie Non-Clog Hammermill is the only crusher with a moving breaker plate. Provides positive mechanical feed. No manual pushing of material needed. Even the most plastic, wet, clayey material will not slow production or clog hammers. This feature alone has saved the cost of 10 men in one company!

And because the Dixie moving breaker plate can be adjusted forward or backward from the hammer points, quality and size of production can be controlled. This feature also provides additional assurance against clogging.

These are but two of Dixie's outstanding features. Send coupon below for free booklet, "More Efficient Crushing of Raw Materials" which gives complete facts.

DIXIE MACHINERY MFG. CO.
4202 Goodfellow Blvd., St. Louis, Mo.

GET THE FACTS!

DIXIE MACHINERY MFG. CO.
4202 Goodfellow Blvd., St. Louis, Mo.

Please send free booklet on Dixie Non-Clog Hammermills. We want to crush.....

Name .....

Company .....

Address .....

City..... State.....

Parsons
MODERN ENGINEERING
FOR TODAY'S PRODUCTION
...TOMORROW'S COMPETITION

•

Oval Bag Dust Arrestors

The most effective and destructive production blockade found in any plant is dust and dirt. Lack of dust control means deterioration of plant machinery, equipment and a tremendous loss in production. Dust has been the cause of millions of dollars worth of time lost by employees due to illness. • Lack of dust control costs many, many times more than the harnessing and actual control of it. In practically every installation of Parsons Oval Bag Dust Arrestors this fact has been proven in a very short time. Parsons Oval Bag Dust Arrestors are the result of engineering perfection gained over a long period of years in designing and building some of the outstanding dust arrestors in the world's leading industrial plants. Our engineers with over a quarter of a century's experience will be more than glad to discuss your particular dust problems and work out the solution. Dust control means peak production, more productive working hours per employee and machine plus protection for plant, equipment, labor.

Write for free catalog "Mastery of The Air."

PARSONS
ENGINEERING CORP.
2545 EAST 79th ST.
CLEVELAND, OHIO

YOU CAN BOOST YOUR PLANT CAPACITY 8% to 20% NOW!

(1) Keep your thickener loaded to capacity and make provisions to keep it moving even when overloaded.

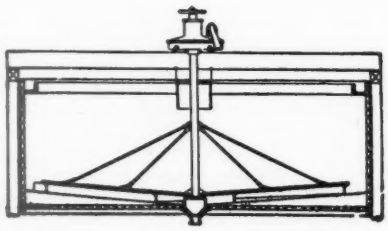
(2) Regulate your ball mill feed automatically to compensate for changes in feed size, moisture and hardness.

(3) Keep surges out of your classifier circuit by dividing your separation into individually controlled compartments.

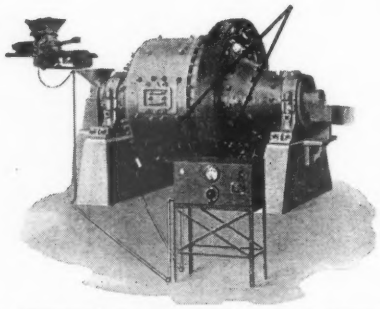
(4) Control your mill feed by weight rather than by volume—

(5) Permit your filter to run to best advantage regardless of moisture variation in the cake.

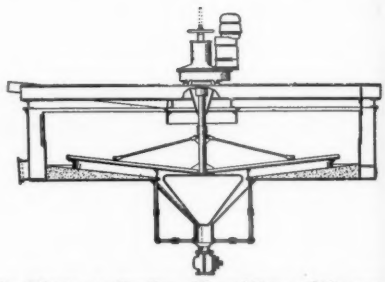
(6) Change the grinding characteristics within your mill.



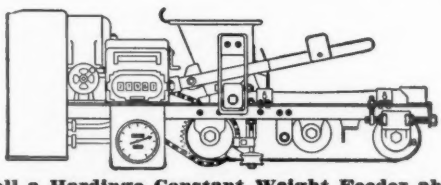
(1) Install the Hardinge "Auto-Raise" Mechanism on Thickeners so you can keep operating right through an overload. This device lifts the scraping mechanism over the obstruction and digs out of trouble. Bulletin 31-C.



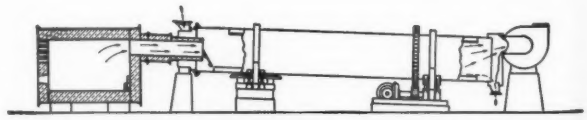
(2) Connect an "Electric Ear" Sound Control to your mill feeder and keep mill up to its maximum grinding capacity with nominal attendance. Bulletin 42.



(3) Place a Hydro Classifier with controllable settling pool volume and teeter washing column in your classifier circuit and obtain a balanced separation and avoid surges caused by improper ratio of density to volume. Bulletin 31-C.



(4) Install a Hardinge Constant Weight Feeder ahead of your mill, and feed by weight to minimize fluctuations in rate and get a record of the actual weight fed. Bulletin 33-C.



(5) Use an "XH" Ruggles-Coles Dryer with automatic temperature control to increase flexibility of drying operations and permit wider latitude of moisture in the feed than is possible with any other system. Bulletin 16-C.

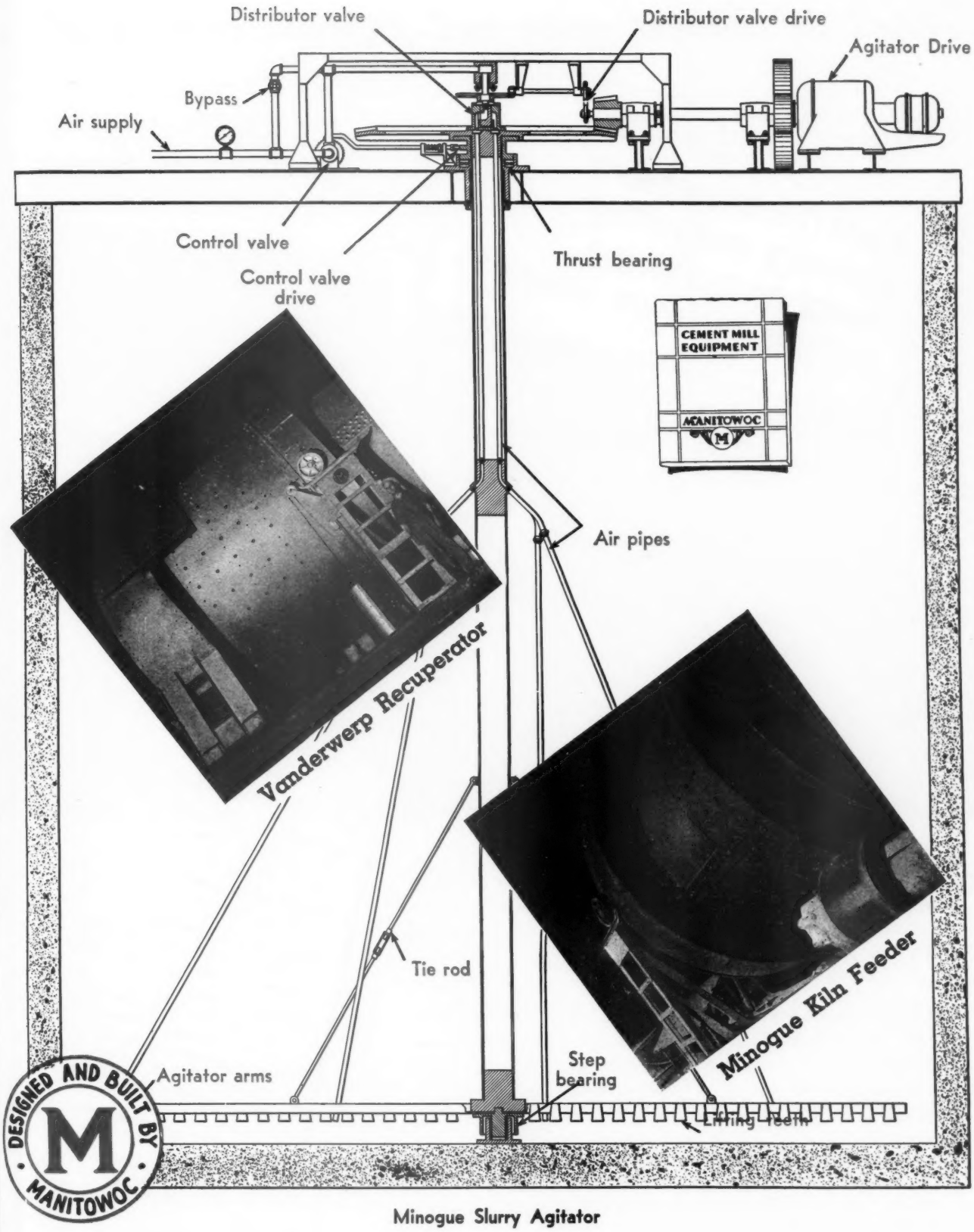
(6) Wet Grinding—Equip your Hardinge Conical Mill with a Reverse Cone Grate and High Pulp Level Discharge which will boost capacity 8% or more.

Dry Grinding—Use a "Loop" air Classifier to increase mill grinding efficiency and capacity. Bulletin 13-D.

HARDINGE

COMPANY, INCORPORATED - YORK, PENNSYLVANIA

122 East 42nd Street, New York, N. Y.
205 West Wacker Drive, Chicago, Illinois
501 Howard Street, San Francisco, California
200 Bay St., Toronto, Ontario, Canada



Minogue Slurry Agitator

MANITOWOC ENGINEERING WORKS

Division of

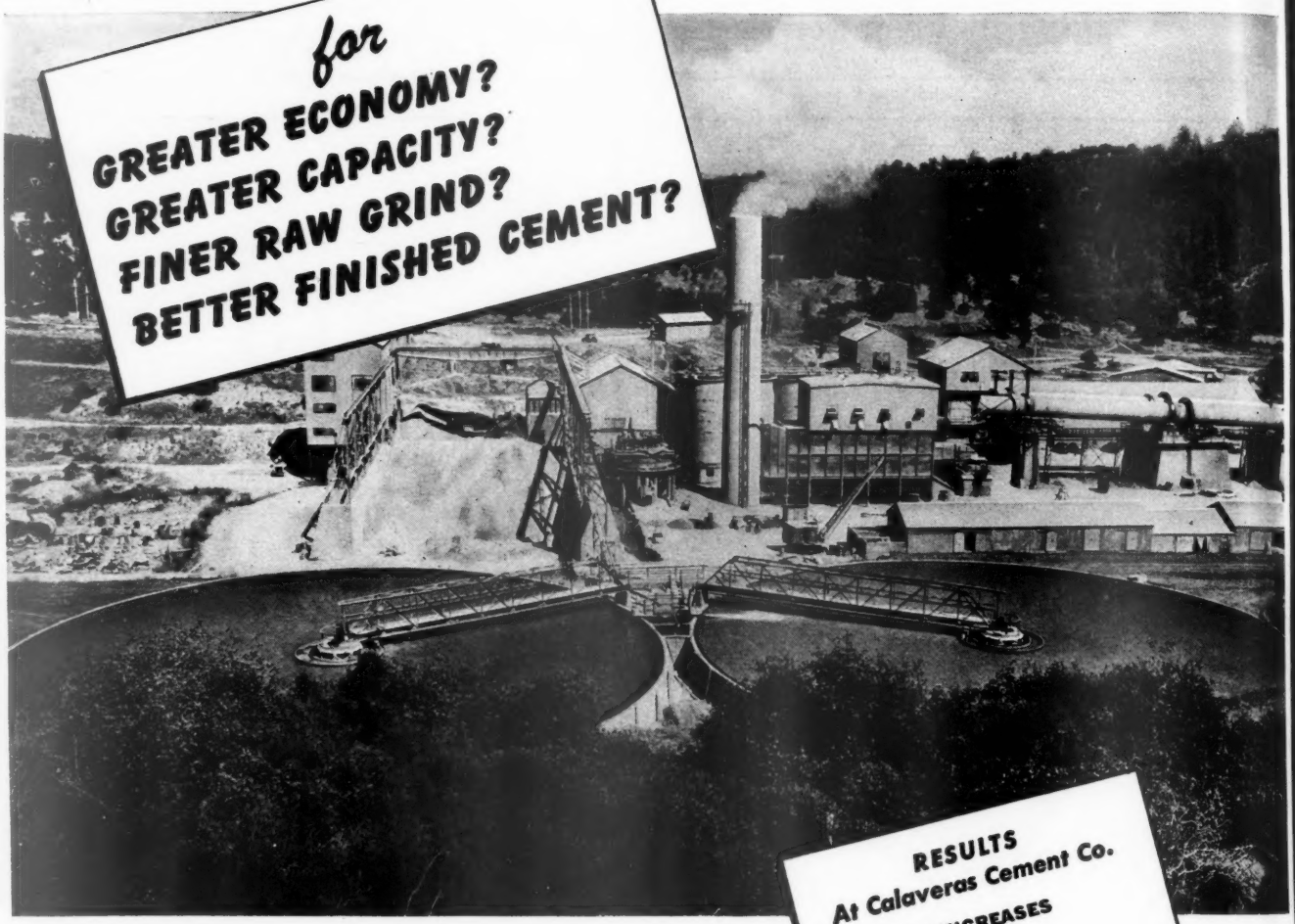
Manitowoc Shipbuilding Company

GENERAL OFFICES AND PLANT
Manitowoc, Wisconsin

CHICAGO OFFICE
131 E. Wacker Drive

Want to convert your wet process cement plant

for
GREATER ECONOMY?
GREATER CAPACITY?
FINER RAW GRIND?
BETTER FINISHED CEMENT?



RESULTS
At Calaveras Cement Co.

CAPACITY INCREASES
Raw Grinding—61%
Rotary Kilns—13%

POWER DECREASES
Raw Grinding—36%

FINER RAW GRINDING
94%—200 mesh; formerly 88%
0.5% + 100 mesh; formerly 3-4%

BETTER CEMENT
Better quality due to elimination of stray oversize and finer grinding. More uniform slurry as to particle size, moisture and composition. Improved burning conditions.

Dorr C.C.G. with Dorr classifiers is not only for the new wet process cement plant starting from scratch with individual mills for primary and secondary raw grinding. Existing plants with raw compartment mills or individual mills can be converted without interrupting operation—and with definite results!

What may be expected is indicated by the production results shown at the right from the Calaveras Cement Co.'s plant at San Andreas, California—which now employs partial Dorr C.C.G. Calaveras is a conversion from open circuit grinding—and the results speak for themselves.

If you are interested in lowering your costs—or producing a better finished cement, let us give you more specific information. A conversion to Dorr C.C.G. can really show results—and should repay the change-over cost in less than a year!

DORRCO

THE DORR COMPANY, ENGINEERS

NEW YORK, N. Y. . . . 570 LEXINGTON AVE.
ATLANTA, GA. . . . WILLIAM-OLIVER BLDG.
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SUGAR PROCESSING
PETREE & DORR ENGINEERS, INC.
570 LEXINGTON AVE., NEW YORK

DORR

RESEARCH ENGINEERING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

NISA (*from page 48*)

filing Form 42B for each one of them at once, in order to obtain the most favorable consideration of their cases.

Many plants in the areas designated as critical labor-shortage sections were working 48 hours weekly even before the issuance of the order requiring the long work week. Some companies are applying the 48-hour rule to all except their office employees, although these, when working in plant offices, are covered by the order just as are plant workers.

With respect to the payment of double time under the so-called double-time order—Executive Order 9240 (see PIT AND QUARRY, October 1942, pages 35-36; November 1942, pages 50-51; April 1943, pages 38-40)—every producer of industrial sand is, according to Mr. Ahearn, bound by its provisions because of his producing materials either for government contractors or for subcontractors.

Hamilton Allport, chairman of the association's Research Committee, presented a new report on a research program for the organization. It is undergoing minor revision and will be made available later.

The association's consulting engineer, Stanton Walker, spoke briefly of technical matters of interest to the members present and of the activities of technical committees of other associations in industries with which the industrial-sand group has commercial relations.

In the absence of Theodore C. Waters, attorney of Baltimore, who was scheduled to speak on occupational-disease compensation rates, Mr. Ahearn read his report. Various methods for determining such rates are in effect in different states. Some of these states, such as California, Massachusetts, Minnesota, New Jersey, New York, Virginia and Wisconsin, have independent bureaus which determine the rates applicable to given classifications, and the insurance companies must charge these rates, which, practically speaking, are those recommended by the National Council on Compensation Insurance of New York City.

Other states, such as Connecticut, Illinois, Iowa, Nebraska, New Mexico, Rhode Island and South Dakota, have no authority to regulate compensation rates, and the insurance companies may bargain with the employers for the rate to be charged. In effect, however, the rates agreed upon are the rates recommended by the National Council on Compensation Insurance.

The states of Ohio, Washington and West Virginia have exclusive state funds which determine their own rates.

In all the other states of the United States the rates imposed are uniform, as recommended by the National Council.

Mr. Waters pointed out that most of the occupation-disease compensation statutes are of recent enactment and, therefore, the data of experience are necessarily meager.

The standard form of compensation policy, Mr. Waters explained, is divided into two classes of protection to employers: (1) under paragraph 1 (a) of the policy, which indemnifies the employer against claims under the state workmen's compensation act, and (2) under paragraph 1 (b), which indemnifies the employer for his common-law liability, which is, however, exclusive of occupational-disease claims.

The experiences of those states having occupational-disease compensation statutes may be summarized follows, he said:

Code No. 1624—*Quarries.*—The promulgated rate is 40 cents per $100 of payroll, with no state having a loss experience that would justify such a rate. The average rate is 15 cents pure premium.

Code No. 1741—*Flint and Spar Grinding.*—The promulgated rate is $5.40 per $100 of payroll although no state has a loss experience that would justify such a rate. The average rate is 72 cents pure premium.

Code No. 1803—*Stone Cutting and Polishing.*—The promulgated rate is $4.80 per $100 of payroll. The State of Wisconsin shows a pure premium of $6.70; other than that there is no state where a pure premium even as high as $2 would be indicated and the average pure premium rate justified is $1.03.

Code No. 3081—*Foundries, Iron.*—The promulgated rate is 80 cents per $100 of payroll, with no state having a loss experience that would justify such a rate. The average pure premium is 10 cents.

Code No. 3082—*Foundries, Steel Castings.*—The promulgated rate is $1 per $100 of payroll, with no state having a loss experience that would justify such a rate. The average rate, pure premium, is 18 cents.

Code No. 3085—*Foundries, Nonferrous Metals.*—The promulgated rate is $1 per $100 of payroll, with no state having a loss experience that would justify such a rate. The pure premium, average rate, is 28 cents.

This analysis is based on the reports for the policy years 1935 to 1939, inclusive; the experience data for more recent years are not yet available.

Mr. Waters points out that the promulgated rate may differ from the actual rate effective in a given state. He cited the following applicable rates for the classifications indicated in four of the states whose records he studied:

Code	Illinois*	Michigan	Missouri	New York
1624	$0.43	$0.53	$0.30	$0.34
1741	5.86	7.47	2.70	5.59
1803	5.21	5.12	2.40	4.31
3081	.87	.43	.75	1.10
3082	1.08	.54	.90	1.10
3085	1.08	.54	.75	1.10

In some states, according to Mr. Waters, certain preferential rates are given to some companies because there are limitations of exposure or particular practices employed by employers where there is exposure to potential hazards. In some states, for example, preferential rating has been given to manufacturers because of their use of substitutes for silica.

Summarizing, Mr. Waters said that the present methods of determining occupational-disease compensation rates, with particular reference to silicosis, are arbitrary and not justified by the actual experiences of the insurance companies in those states wherein occupational diseases are compensable. The only attempted justification for the rates, according to Mr. Waters, is the official opinion of the insurance companies that, in the event of a business depression, they may be faced with a substantial number of claims for which compensation might be allowed. He believes that the insurance companies have been and still are prejudiced in their consideration of silicosis compensation. He said that officials of the National Council on Compensation Insurance of New York City have indicated that they would be glad to entertain an interview with the National Industrial Sand Association's officials and to consider a specific request for a reduction in rates in those classifications in which its members would be interested.

The convention of the association closed with the re-election of the officers and directors then in office. J. M. Strouss (Morgantown, West Virginia) is president; T. C. Matthews (Lewistown, Pennsylvania) is vice-president; A. Y. Gregory (New York City) is treasurer. The board comprises these officers and Hamilton Allport (Chicago), E. J. Beyer (Rockwood, Michigan), E. M. Durstine (Columbus, Ohio), C. M. Hardy (Evansville, Indiana), Mark T. McKee (Detroit, Michigan), and George A. Thornton (Ottawa, Illinois). V. P. Ahearn continues as executive secretary and Stanton Walker as consulting engineer.

*These are the occupational-disease rates independent of and in addition to the workmen's compensation rates.

PERSONAL MENTION

EDWARD S. ROGERS, JR., has been appointed general sales manager of the Medusa Portland Cement Company to fill the vacancy caused by the recent death of Andrew T. McCormack. He had been Mr. McCormack's assistant. L. E. DE CAMP has been advanced to the post of assistant general sales manager and HARRY G. NEVINS has been made district sales manager at Chicago.

J. GRANO, formerly superintendent of the Bath plant of the Pennsylvania-Dixie Cement Corporation, has severed his connection with the company following the shut-down of the Bath plant for the duration.

FRANK C. ANGLE, manager of the Allis-Chalmers San Francisco district office for the past seven years, has been appointed manager of the entire Pacific region.

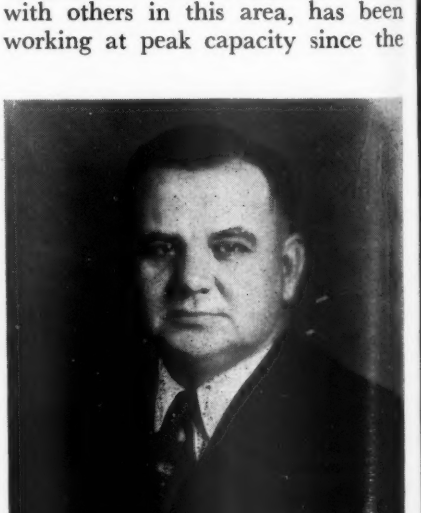
AUGUST VILBIG, co-owner of the Vilbig Gravel and Construction Company, Dallas, narrowly escaped death when his car struck loose sand in one of his pits south of Irving and careened into the lake. As the car rolled down the embankment it turned over several times and landed in deep water. A passing truck driver quickly rescued him. Mr. Vilbig was sent to his home immediately and his injuries reported not serious.

HOWARD KENYON recently assumed the duties of advertising manager of the LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa, taking the place of NED DAVIS who has joined the armed forces. Mr. Kenyon was formerly connected with the American Rolling Mill Company and the Howard Swink Advertising Agency of Marion, Ohio.

J. E. JELLICK, long connected with the Portland Cement Association in its promotional and engineering efforts on the Pacific Coast, has been appointed sales manager of the Pacific Portland Cement Company according to an announcement by J. A. McCarthy, president of the company.

D. A. ROBISON has resigned as vice-president of the Caterpillar Tractor Company, to become the company's distributor at Salt Lake City, Utah, and GAIL E. SPAIN, who was made a vice-president in 1942, succeeds him as administrative vice-president.

GEORGE A. MATTISON, JR., president of the Woodstock Slag Corporation, Birmingham, Alabama, is typical of the many successful American business men who also find time to devote to worthy civic and social movements. His company, along with others in this area, has been working at peak capacity since the



George A. Mattison, Jr.

Beat the Schedule with PLAT-O by DEISTER
Dependability . . . the ability to stand up under excessive loads . . . 24 hours a day—week in and week out . . . is the real measure of both man and machine for the duration.
Rugged, smooth running Plat-O Vibrating Screens are designed and built to stand up under the most grueling and unfavorable operating conditions . . . to consistently and accurately grade more tons per hour at a lower cost per ton . . . and even in these demanding times, enable their owners to "beat the schedule."
All welded construction, fully cushioned vibration, positive automatic screen cloth tension . . . are your assurance of dependable, trouble free long life. Delivery can usually be made within a week or ten days. Phone or wire today!
DEISTER MACHINE COMPANY
FORT WAYNE, INDIANA

beginning of the war effort producing aggregates for the construction of various vital projects throughout the south. These have included powder and munitions plants, airports, army and navy camps and bases, chemical warefare plants and numerous vital industrial projects.

In January of this year Mr. Mattison was elected president of the Birmingham Kiwanis Club and was re-elected president of the Birmingham Chamber of Commerce for the second year. On January 25 he was re-elected president of the National Slag Association for the sixth consecutive year. He is also on the board of directors of the Associated Industries of Alabama which is affiliated with the National Association of Manufacturers and president of the alumni association of Auburn College from which he graduated with a degree in electrical engineering. He is also a past commander of Post Number 1 of the American Legion, vice president of the Birmingham Boys' Club, and is on the Divan of Zamora Temple, A. A. O. N. M. S. In addition he also finds time to be an air-raid warden!

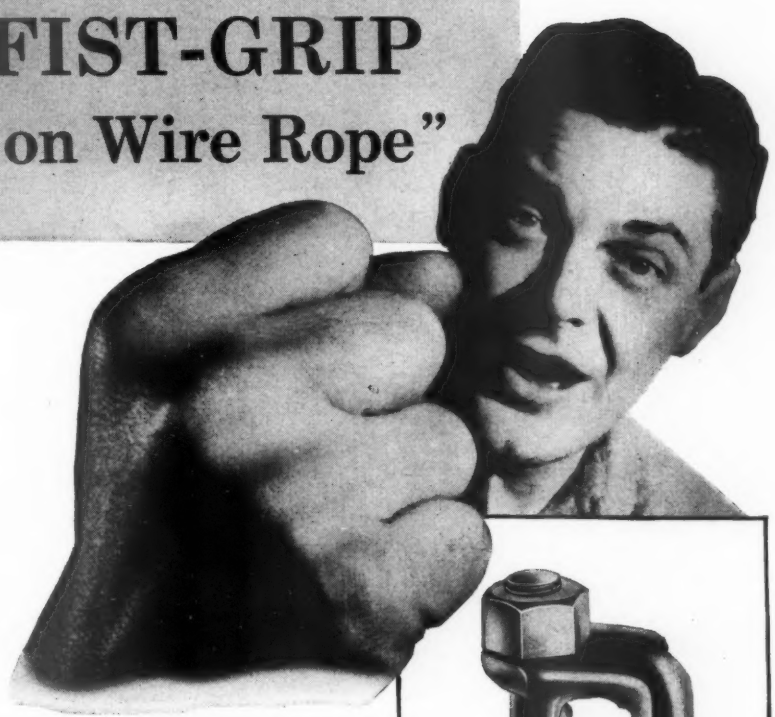
DONALD E. KOCH, formerly chief chemist of the Giant Portland Cement Company, Egypt, Pennsylvania, has been made superintendent. He had been acting superintendent since the resignation last October of O. D. HAVARD.

GORDON LEFEBVRE has been elected president and general manager of the Cooper-Bessemer Corporation succeeding B. B. WILLIAMS, who will remain active, continuing his duties as chairman of the board.

DONALD R. POSTON, 57, who was associated with the Superior Cement Corporation, died May 25 in Columbus, Ohio, of a heart attack. He first engaged in coal mining with his father, the late E. M. Poston, and later began producing sand and gravel in southern Ohio before becoming connected with the Superior Cement Corporation.

JOHN MEYER, 46, secretary of Sauerman Brothers, Inc., died in Chicago on May 14. He was born in Chicago and was engaged in railroad construction and engineering work in that city before joining the Sauerman organization as production manager in 1929. He was elected secretary of the company in 1942. He leaves a widow and two daughters.

"Save Bullet-Metal for Our Boys' Guns ... with a FIST-GRIP on Wire Rope"



"YOU can save rope, save clips — just as we do — by using Laughlin 'Fist-Grip' Safety Clips, instead of 'finger-pinch' U-bolt clips that crimp and injure wire rope.

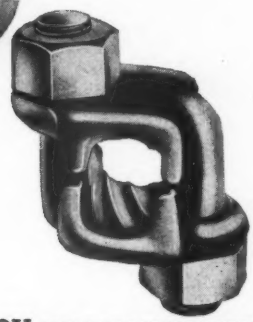
"With 'Fist-Grip' Clips the bolts are on opposite sides — the four bearing surfaces grip like a fist, not a 'finger-pinch'. Three 'Fist-Grip' Clips do the work of four U-bolts! Design is so strong that less steel is needed in each clip. *25% less steel* in all is saved per assembly.

"I figure the rope, clips and steel saved mean more guns and bullets for our boys."

Competitive Tests Prove Greater Holding Power of Laughlin "Fist-Grip" Clips

With 4 U-bolt clips at 37,750 lbs. load, ¾" rope broke at saddle, while only 3 Laughlin Safety Clips held the same load without rope breakage, because extra bearing surfaces grip without crimping. Here's the clip that fights for your country! Investigate!

★ ★ ★ ★



YOU can save manpower and metals with the "FIST-GRIP" CLIP

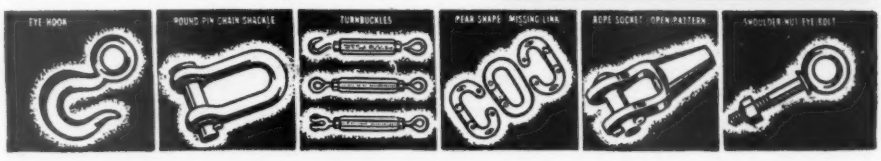
Saves Manpower

greater holding power, less work; can't be put on wrong.

Saves Metals

no special-shaped wrench, fewer clips needed, no spoiled rope, 25% less steel.

THE THOMAS LAUGHLIN *Company*
PORTLAND, MAINE



E. J. ECKENSBERGER SR., 68, chief chemist at the Lehigh Portland Cement Company plant at Mitchell, Indiana for 36 years is dead. A native of Pennsylvania he had lived in Indiana for many years. Surviving are the widow and three sons, two daughters and two sisters.

BAXTER D. M'CLAIN, 71, since 1918 attorney for various cement interests, died at his home in Kansas City, June 3. He served in the Spanish-American War as a captain and in the World War I as a colonel. Returning from France, he served two terms in the Kansas Senate and then went to New York as legal representative for the International Cement Corporation. He had maintained a law office in Kansas City until the time of his death and there represented a number of cement companies in Kansas, Oklahoma, and Missouri.

OVA A. LAWSON, 59, owner of the Lawson Sand & Coal Company of Hannibal, Missouri, died May 27. He established the business in 1922.

ALBERT C. BRUFF, 63, died May 25 in Boston. A resident of Newton, Massachusetts, he had been associated with the Edison Cement Company for 32 years, and recently was with the National Portland Cement Company.

L. H. HARTMAN, president of the Valve Bag Company and widely known among lime and cement manufacturers passed away in June. Funeral services were held Monday, June 14 at Toledo.

MRS. MARGARET MYERS, wife of Claude P. Myers, head of the Myers Gravel & Sand Company of Anderson, Indiana, died at her home in that city recently. Besides her husband she is survived by a daughter, Helen Louise Myers, and a son, Lieut. Robert Myers, of the United States Air Corps.

G. ALLAN RUTHERFORD, 51, vice-president of the Eau Claire Sand & Gravel Company, Eau Claire, Wisconsin, died recently in an Eau Claire hospital. A veteran of World War I, Mr. Rutherford had long been prominent in the business and civic life of Eau Claire. He is survived by his wife, his mother, two brothers and two sisters.

Constructing Airforce Runways...

EAGLE WASHERS

PAVE THE WAY—SPEED THE DAY

Economical operation, peak production, years of faithful service—that's what you can count on from EAGLE Equipment. Because EAGLE Equipment has proved its value in peacetime, it is in greater demand today when huge quantities of high quality sand and gravel are needed in a rapidly expanding volume for military and commercial uses. EAGLE engineers have sponsored and guided the major developments in the classifying, washing and dewatering fields.

Our engineering staff will gladly recommend EAGLE machines and methods for stepping up production and reducing costs in plants not yet equipped for "all-out" efforts. Write for Bulletin 41 showing the complete line of EAGLE sand and gravel processing machinery.

The new EAGLE Dewaterer for handling products of extra low moisture content.

EAGLE IRON WORKS
DES MOINES, IOWA

TRADE NOTES

A new 12-page bulletin A-375 has just been published by the Vulcan Iron Works, describing and illustrating the company's products for the pit-and-quarry and process industries. Since most Vulcan products are tailored to fit particular applications, tables of sizes, capacities, etc., are not included. Sufficient information is given, however, to enable operators to determine the application of equipment to their requirements.

Builders Iron Foundry (Builders-Providence, Inc.), Providence, Rhode Island, a firm that has been prominent for years in the design and manufacture of venturi meters, venturi controllers, gauges, etc., for water and sewage works as well as power and industrial plants, has won for the second time the Army and Navy "E" production award.

The Athey Truss Wheel Company, Chicago, announces the promotion of Claude E. Matthews to the position of supervisor of service and parts. He has been with the company since 1937 when he started as a factory serviceman.

A new bulletin describing the popular line of Rotor-Lift portable crushing-and-screening plants made by the Diamond Iron Works, Inc., Minneapolis, has just been issued. It contains data and specifications of interest to all sand-and-gravel operators.

TRAFFIC News Digest

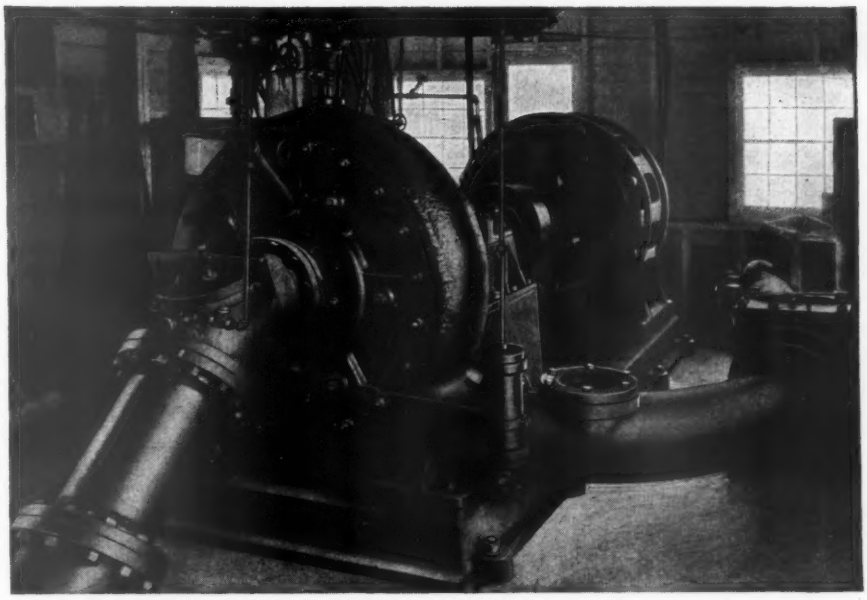
I.C.C. Reports

Cement.—Fourth-section application No. 19317. Cement to and between points in Florida. By division 2. Authority granted in No. 19317, by F. S. O. No. 14917, on conditions, to establish and maintain rates on cement and related articles, in straight or mixed carloads, from producing points in Illinois, including west-bank Mississippi River points in Missouri, Indiana, Ohio, Maryland, and southern territory, to points in Florida, without observing the long-and-short-haul provisions of the fourth section. Temporary relief was granted by F.S.O. 14415, effective February 28, 1942.

Limestone.—Docket 28889. Great Lakes Sugar Company v. Chesapeake & Ohio, *et al.* By Examiner E. L. Glenn. Rate charged on crushed limestone, fluxing stone, in carloads, moved between September 20 and October 25, 1939, from Calcite, Michigan, to Findlay, Ohio, inapplicable. The applicable rate of $3.02 was found unreasonable to the extent it exceeded a rate of $1.42, minimum weight 90 per cent. of the marked capacity of the car, except that when loaded to its cubical or visible capacity, the actual weight will apply. Waiver of outstanding undercharges authorized.

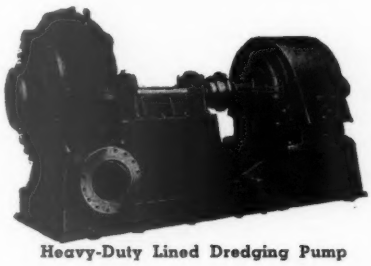
Asphalt Rock. — Fourth-section application No. 19871. Asphalt Rock, Oklahoma to Texas, embracing fourth-section applications Nos. 19963, 20010, and 20219. By division 2. Authority granted by F.S.O. 14916, on conditions, to establish and maintain rates on asphalt rock, in carload lots, from specified points in Oklahoma to destinations in Texas, without observing the long-and-short-haul part of the fourth section. Temporary relief was given by F.S.O. 14660, as supplemented.

Brick and Clay Products.—Fourth-section application No. 19103. Brick and Clay Products within and to the South. By division 2. Authority granted by F.S.O. 14915, on conditions, to establish and maintain rates on brick and clay products, in carloads, between points within southern territory, including border points, and from points in Illinois, Indiana, and Missouri to destinations in southern territory, without observing the long-and-



HOW TO SELECT LONG-LIVED PUMPS

There's an old . . . and well founded . . . medical saying that if you want to live long, pick out long-lived ancestors. On that basis alone, the Morris Pumps of today are assured of a long, useful life, for they have the same rugged constitution that has characterized their pump predecessors for more than two human generations. And in addition, the many refinements in design possessed by present-day Morris Pumps have produced remarkably high efficiencies that far exceed those which were formerly possible. Morris bulletins tell the whole story . . . write for copies on centrifugal pump types in which you are interested.



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Double Suction Horizontally Split Pump for Clear Liquids

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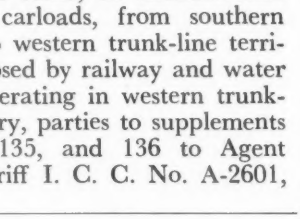
CENTRIFUGAL PUMPS

short-haul part of the fourth section. Relief was authorized temporarily by F.S.O. 14376, and according to the report, the rates for which relief was sought were published to become effective January 26, 1942.

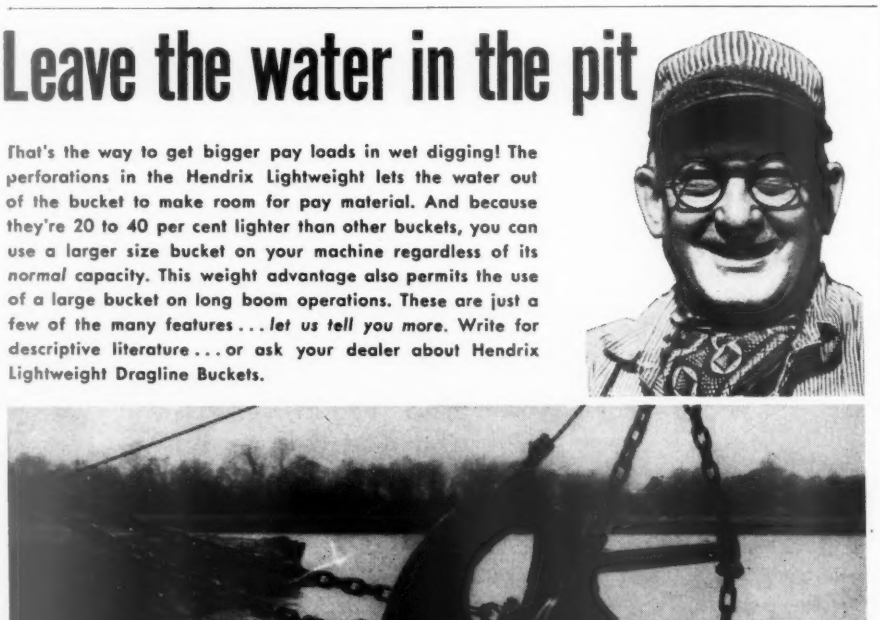
Granite and Marble. — Fourth-section application No. 18762. Granite and marble to New England and Trunkline Territories. By division 2. Authority granted by F.S.O. 14962, on conditions, to establish and maintain rates on granite and marble, in carloads, from New England origins to New England destinations and Trunkline Territories, without observing the long-and-short-haul part of the fourth section. Temporary relief was given by F.S.O. No. 14048 and 14211.

Granite and Marble. — I. and S. No. 4731. Granite and marble to Colorado, embracing I. and S. No. 5141, stone, South to W. T. L. Territory. Rates and carload minimums on rough, dressed, and carved or polished stone, in carloads and less than carloads, from southern territory to western trunk-line territory, proposed by railway and water carriers operating in western trunk-line territory, parties to supplements Nos. 34, 135, and 136 to Agent Kipp's Tariff I. C. C. No. A-2601, not shown to be just and reasonable in part. Suspended schedules ordered cancelled without prejudice to the filing of new ones in accordance with the findings. The report found the proposed rates of column 17.5, carload minimum 50,000 pounds, on the rough-stone group just and reasonable. Proposed rates of column 22.5, minimum 50,000 pounds, on the dressed-stone group are not just and reasonable to the extent that they exceed column 22.5, minimum 36,000 pounds. Proposed rates of column 30, minimum 36,000 pounds, on the carved or polished stone group, are just and reasonable. Proposed rates of column 55, on stone, all finishes, in less than carloads, are not just and reasonable and that just and reasonable rates would not exceed column 45. Commissioner Johnson dissented in part, stating that the rates on carved or polished stone, in carloads, from southwestern territory to western trunk-line territory should not exceed column 27.5, minimum weight 36,000 pounds.

Leave the water in the pit



That's the way to get bigger pay loads in wet digging! The perforations in the Hendrix Lightweight lets the water out of the bucket to make room for pay material. And because they're 20 to 40 per cent lighter than other buckets, you can use a larger size bucket on your machine regardless of its *normal* capacity. This weight advantage also permits the use of a large bucket on long boom operations. These are just a few of the many features . . . *let us tell you more.* Write for descriptive literature . . . or ask your dealer about Hendrix Lightweight Dragline Buckets.



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GET IT INTO THE FIGHT–NOW

HENDRIX Lightweight DRAGLINE BUCKETS

Made in three types—Light, Medium, and Heavy Duty. . . . . Sizes—from ⅜ cu. yd. to 20 cu. yds.

MANGANESE STEEL CHAINS, FITTINGS, and REVERSIBLE TOOTH POINTS are STANDARD EQUIPMENT on All Buckets

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Central Freight Association

Docket 73459. (Shipper's proposal)—Lime, common, hydrated, quick or slaked. Carload. Establish on, from Port Huron, Michigan to East St. Louis, Illinois, and St. Louis, Missouri, 23 cents, minimum weight 30,000 pounds; 18 cents, minimum weight 50,000 pounds.

Docket 73455. (Shipper's proposal)—Brick, and articles taking brick rates, carload, minimum weight 60,000 pounds, except that when car of less capacity is furnished the marked capacity of the car will govern. Rule 24 of Official Classification is not to apply. Establish a rate of $6.83 per net ton from Louisville, Kentucky, to Niagara Falls, Ontario.

Docket 73480. (Shipper's proposal)—Crushed stone or screenings, in bulk, in open-top cars, carload. Establish a rate of $2.64 per net ton from Calcite, Michigan, to St. Mary's, Ontario. Subject to Ex Parte 148, so that increases now suspended but effective again January 1, 1944 are to be added at that time.

Docket 73491. (Carrier's proposal)—Brick, and articles taking brick rates as described in List 1, P.R.R. Tariff 27-C, minimum weight 60,000 pounds. Establish a rate of $2.86 per net ton from Detroit, Michigan to Salem, Ohio, *via* P.R.R. To expire one year from effective date.

Docket 73509. (Shipper's proposal)—Cement mix, consisting of

cement and fine and coarse aggregate, dry, in paper sacks, carload, minimum weight 50,000 pounds. Establish a rate of 28 cents from Cincinnati, Ohio, to New York City.

Docket 73549. (Carrier's proposal)—Stone, crushed, and stone screenings, in bulk, in open-top cars, carload. Establish a rate of 83 cents per net ton from Ridgeville, Indiana to Fort Recovery, Ohio.

Docket 73560. (Shipper's proposal)—Lime, common, hydrated, quick or slaked, carload. Establish on, from Mosher and St. Genevieve, Missouri, to East Jordan, Michigan, 25 cents, minimum weight 30,000 pounds, 20 cents minimum weight 50,000 pounds.

Docket 73681. (Shipper's proposal) — Lime, common, hydrated, quick or slaked, carload. Establish a rate 18 cents minimum weight 30,000 pounds, and 14 cents, minimum weight 50,000 pounds, from Wyandotte to Mancelona, Michigan.

Docket 73685. (Shipper's proposal)—Limestone, agricultural, unburned, not ground or pulverized, in bulk, in open-top cars, carload, minimum weight 90 per cent. of the marked capacity of the car, except that when the car is loaded to its full cubical or visible capacity, the actual weight will apply. Establish a rate of $1.71 per net ton from Luckey to St. Clairsville, Ohio, *via* New York Central (W)-Fostoria-Baltimore & Ohio. Also *via* New York Central (W)-Heath—Baltimore & Ohio.

Docket 73686. (Shipper's proposal)—Sand, all kinds, and gravel, in open-top cars, minimum weight 90 per cent. of the marked capacity of the car, except that when the car is loaded to its full cubical or visible capacity, the actual weight will apply. Establish a rate of 66 cents per net ton from Dresden and Gravel Pit to Heath, Ohio, *via* Pennsylvania Railroad-Heath-New York Central.

Docket 73687. (Carrier's proposal)—Lime, common, hydrated, quick or slaked, carload, in bags, barrels, casks, iron drums, or in bulk. Establish a rate of 21 cents, minimum weight 30,000 pounds, and 17 cents, minimum weight 50,000 pounds, from Mosher and St. Genevieve, Missouri to North Muskegon, Michigan.

Save with War Savings Bonds

Segmental Design + Heat Resistant Alloy = *Less Maintenance and More Product*

Most of the users of Amsco Alloy segmental rings for kiln feed and discharge ends are cement producers, but some of them are makers of lime and heavy chemicals. Without any exception we know of, all of them agree that the combination of heat-resistant chromium-nickel alloy with a good segmental design is unequalled for effecting continuous kiln operation and low maintenance cost. Repeat orders are one evidence of this fact.

The temperatures to which kiln rings are subjected are so high that ordinary metals soon show permanent "growth" or belling out; and the distortion allows the brick to fall out—this defect quite aside from the cracking and scaling that curtail the casting life.

None of these difficulties is experienced with Amsco Alloy rings. The segments have room to expand and contract without warping, and the heat-resistant metal does the rest.

Their use means fewer shutdowns for repairs, which in turn mean fewer man-hours and fewer parts for maintenance; and a real gain in production volume over a given period of time.

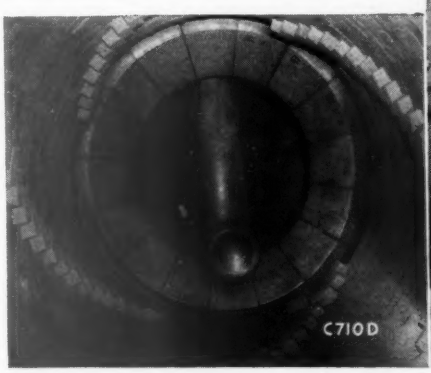
The one of the several analyses of Amsco Alloy, grade F-10, that is most commonly used for feed end and nose rings, has excellent strength and creep resistance up to 2100° F.; and comparatively good residual ductility when cold.

Among the many applications for this metal in cement plants and comparable operations are also dampers, feed pipes, hopper extensions, lifter bars, clinker drag chains, grates and burner nozzles. Our experience, research and production facilities are at your service.

Bulletin 108, sent on request, tells the whole story.

C-710-D—A 16-segment conical feed end ring.

C-709-B—Amsco Alloy segmental nose or discharge ring.



Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY

Legal Decisions

By LEO T. PARKER

●

Law of Conditional Sales

Either a properly recorded conditional contract of sale, or a chattel mortgage, gives the seller of equipment a first lien. Neither a conditional contract of sale nor a chattel mortgage is valid, with respect to innocent parties, unless it is recorded in a county.

Either a conditional contract of sale or a chattel mortgage recorded in any county in any state in the United States is valid with respect to all persons in the whole United States. At first hand this law seems impractical and unreasonable, because no seller can search the records in every county in the whole United States to learn whether another has a first lien on mining equipment. This law is designed to protect sellers who are, therefore, required by law to record a conditional contract of sale or a chattel mortgage only in the county where the sale was made or in some instances where the equipment is installed. See *Conway,* 41 Pac. (2d) 1049.

It is generally believed that neither a conditional contract of sale nor a chattel mortgage may be foreclosed against a person serving in the military forces of the United States. However, a late higher court held that this law is not applicable where the conditional contract or the mortgage was signed after the Soldiers' and Sailors' Relief Act was enacted in October 17, 1940. For example, in *Price v. Phillips,* 12 So. (2d) 59, it was shown that a purchaser executed a chattel mortgage on December 15, 1941. In January, 1942 the purchaser joined the United States Army. In March, 1942 the agreed payments were not made and the seller, or holder of the chattel mortgage, filed a foreclosure suit. It was contended by the counsel for the purchaser that the suit was invalid because of the above mentioned Soldiers' and Sailors' Relief Act. However, the higher court held that this law was not applicable and that the suit was valid. This court said:

"In the first place, under the terms of Section 302 of the Soldiers' and Sailors' Civil Relief Act, approval October 17, 1940, 50 U.S.C.A., it is provided that the provisions of the section relating to the stay of foreclosure proceedings under a mortgage on real or personal property only apply to obligations originating prior to the approval of the act."

Free-Storage Contract Unlawful and Void

Frequently business concerns ship or store merchandise, equipment and the like and become involved in litigation when a bill higher than the agreed rate is presented. Therefore, it is important to know that modern higher courts hold that a provision in a warehouse receipt or common carrier's bill of lading by which the warehouseman or carrier agrees to transport or store merchandise at a rate less than that established by the tariff schedule, is void. For example, in *Hanaman v. Liberty Trucking Company,* 7 N. W. (2d) 609, it was disclosed that a common carrier by motor truck transported an 1,800-pound machine. The consignee was not ready to take delivery of the machine and he testified, in the subsequent trial, that a trucking company official promised to store the machine free of any charges until it was convenient for him to accept delivery.

Later the trucking company refused to deliver the machine to the consignee and shipper until he paid $10 for transportation and $63.35 for storage, which had not been paid. The shipper contended he was not liable for payment of the storage charges because, as above explained, the trucking company official had promised to make no charge for this service.

It is interesting to observe that the higher court held that the trucking company had a valid lien on the machine until both the transportation and storage charges were paid. This court said:

"The defendant (trucking company) was not only authorized, but was positively required, to make the scheduled charges for storage, as well as transportation, and the lien therefor could not lawfully be waived. . . . Any promise or understanding that there was to be no charge for storage, or no lien therefor for the freight charge, could clearly be unlawful and void."

New Wage-Law Cases

Under ordinary circumstances, where a company pays for watchman service, the employee is not the legal employee of the company whose premises he guards. Of course, this important rule of law is applicable to all kinds of service.

For example, in *Howe Fire Ap-*

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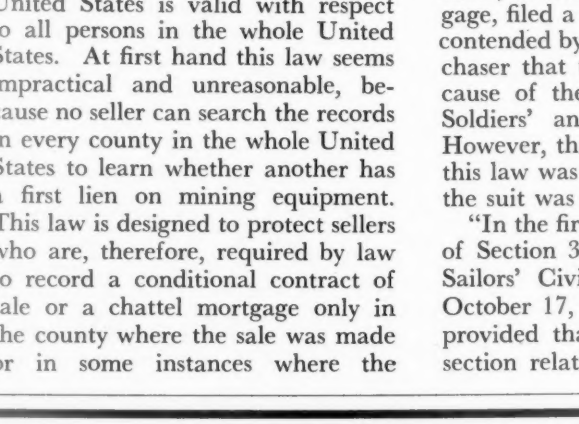
Pulling out the "Biz Ones"



American's foremost dump truck hoisting unit with detachable buckets.

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For hoisting, hauling and dumping . . . for spreading dirt, gravel or crushed stone . . . for pulling up loose guard posts and lifting poles or timbers . . . for handling brick, tile or clay products . . . for snow removal . . . for refuse handling . . . for carrying men and tools (with transport body) . . . for carrying sludge, cement or wet materials (with leakproof buckets) . . . and general hauling jobs, especially where loading is done by hand labor ...that's the Brooks LOAD LUGGER!

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paratus Company v. Humph, 46 N.E. (2d) 259, it was disclosed that a company contracted to supply night-watchman service at a plant from the hours of 4:20 p. m. to 6:40 a. m. The watchman was to call at the place of business every single hour throughout the night. The night watchman was injured while performing his duties and the question arose whether the company which paid him or the company whose premises he was guarding was liable for payment of compensation. The lower court held that the company whose premises were being guarded was the legal employer and liable for payment of compensation to the watchman. However, the higher court reversed this decision and, in holding the service company solely liable, said:

"We can find no evidence to sustain the finding of the Full Industrial Board that appellee (watchman) was in the employ of the appellant at the time of the injury here involved."

On the other hand, a situation could readily arise under which this watchman would be a legal employee of the company whose premises he guarded. For example, if the officials of the latter company had been in the habit of giving the watchman instructions as to how to perform his work and what to do, he would have been its legal employee. This is so because although a company pays a monthly fee to an employer for services rendered by the latter's employee, yet if the hirer assumes control over the employee such hirer becomes responsible as the legal employer where the employee sustains injuries, or negligently effects damage to persons or private property, or a dispute arises over the payment of wages.

Material Contract Strictly Construed

Modern higher courts consistently hold that contracts involving defense work must be *strictly* construed in view of quickly and efficiently effecting their completion. For example, in *Ross v. Taylor,* 12 So. (2d) 153, it was disclosed that the Jones Construction Company was the main contractor for the building of a large military camp for the United States Government at what is now Camp Shelby, Mississippi. A man named Taylor was the successful bidder to sell and furnish a sub-contractor the sand and gravel with which to build the streets, roads, and motor courts for the camp. Taylor, by written contract, agreed to purchase from a man named Ross *all the materials needed to fulfill his contract* at 3 cents per cubic yard at the gravel pits. Taylor mined and delivered a total of 141,728 cubic yards, the aggregate price of which, at 3 cents per yard, was $4,251.84, but he mined from the pits of Ross only 54,145 cubic yards, amounting to $1,624.35. Ross sued Taylor to recover damages for breach of the contract.

During the trial it was shown that the contract contained a clause, as follows:

"It is understood and agreed that you (Taylor) are to get your entire requirements of such materials from lands described below, provided such materials are available both in quality and quantity."

Also, testimony was introduced to the effect that the engineer of the main contractor notified Taylor, as follows: "You are instructed to move your dragline from its present location to a gravel pit containing more metal in the material."

In other words, the pits of Ross did not contain sufficient metal in their material to satisfy the engineer after 54,145 cubic yards of sand and gravel had been removed from the Ross pits. Therefore, in view of

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Genuine Wilfley Tables; Massco-McCarthy Hot Millers; Rock Bit Grinders; Pinch Valves; Belt Feeders; LABORATORY EQUIPMENT; MINE AND MILL SUPPLIES.

Facilities for cement production have multiplied in recent months—thru enlargement and modernizing and by the construction of new plants. Marcy Mills, used internationally in the metal mining industry since 1914, are finding many new jobs to do in this expansion. The photograph above shows a 10-ft. Marcy Ball Mill used for grinding clinker. Since its installation another larger Marcy Ball Mill has been purchased by and delivered to the same interests . . . Inquiries on the use of Marcy Mills in cement manufacture will be answered promptly.

DENVER
SALT LAKE CITY
EL PASO
NEW YORK CITY

The Mine & Smelter Supply Co.

CANADIAN VICKERS, LTD.
MONTREAL
W. R. JUDSON
SANTIAGO, LIMA

this testimony the higher court refused to hold Taylor liable for breaching the contract. This court said:

"It is shown, without dispute, that Mr. Ross knew the requirements of the Guion-Taylor contract and that this was wartime, emergency work. Time was an important element in Taylor's job. Even if sufficient materials of proper quality could have been located on the entire Ross tract, yet if it was in spots, time and expense would have prevented Taylor from moving his machinery from place to place on the lands to find sufficient quantity of the right quality. The word 'available' in the Ross-Taylor contract, as applied to the situation here, would appear to embrace these elements."

"Freezing" Order Voids Contract

It is well-established law that when a Federal law or regulation makes performance of an existing contract illegal, a purchaser who is not at fault is justified in demanding the return of the purchase price he has paid for merchandise which the seller can not lawfully deliver. For example, in *Cinquegrano v. T. A. Clarke,* 30 Atl. (2d) 859, a buyer sued a seller to recover money paid on account of the purchase price of a motor truck, delivery of which was prevented by the supervening Federal Government "freezing" order. The purchaser sued the seller to recover the down payment he had made when the contract was made. In holding the seller obligated to return this money, the court said:

"The effect of this prohibitory order in any event made delivery of the truck unlawful for an indefinite and unreasonable length of time."

Verbal Testimony

All modern higher courts hold that if a conditional contract of sale, or any written instrument, has a clear meaning the party being sued cannot introduce testimony regarding verbal conversation before or after the contract was signed. For illustration, in *Norris v. Wittig,* 6 N.W. (2d) 831, it was disclosed that a seller warranted and guaranteed the quality of the subject of the sale. The seller signed a note for $325 and gave it to the purchaser who proved that the former had breached his guarantee.

Later the seller contended that the note was not a promise to pay the purchaser the sum of $325, but only a receipt that he had taken the merchandise back from the purchaser. The latter filed suit against the seller who had witnesses to testify that he did not sign the note with the intention of admitting that he had positively accepted the merchandise and would repay the purchase price. However, the court promptly held in favor of the purchaser.

Therefore, it is quite apparent that a clear and unambiguous contract must be fulfilled by both contracting parties, and neither may utilize verbal testimony to avoid his assumed obligations. Moreover, no matter what the excuse or explanations one of the contracting parties may have to offer, the court will not listen to such testimony. Therefore, the litigation will be decided solely by reference to the written contract.

Fair Dealing Required

A construction contract is automatically cancelled where either the owner or contractor is permitted to have improper or fraudulent control over the architect or engineer. For example, in *Goodrum v. State,* 158 S.W. (2d) 81, it was shown that an engineer was designated by the state to supervise construction work. During the work the engineer would not authorize the contractor to obtain gravel from a certain pit unless the contractor signed a letter agreeing to withdraw all claims for extension or credit in working time. Due to this compulsion the contractor was delayed in completing the job. The state withheld the sum of $4,175 from the contractor by way of penalties for not completing the job within the number of days specified in the contract.

The higher court held the contractor entitled to full payment because the delay was caused by the unreasonable and arbitrary restrictions placed upon him by the engineer.

Leaking Railroad Cars

Contrary to the opinion of a majority of readers no particular form or notice of claim is necessary to entitle a shipper to recover the statuary penalty of $50 for each failure to adjust and pay, within a prescribed time, claims for loss or damage to property while in the carrier's possession or during transportation. For example, in *Victor Company v. Southern Railway Company,* 24 S.E. (2d) 499, it was disclosed that a corporation sued a railway company to recover the value of three shipments of limestone, and

PYRASTEEL Ring Segments at *discharge end*

PYRASTEEL Ring Segments at the *feed end*

FEED END INSTALLATION

PYRASTEEL Protection at *both* ends

You can't afford to risk kiln-end "burnouts" that cause serious shut-downs and costly repairs. Remember that PYRASTEEL Kiln-Ends are available for both the *discharge and the feed ends* of your rotary kiln. They give continuous service at high temperatures, and outlast ordinary castings many times over . . . as proved in scores of installations where PYRASTEEL is giving satisfactory results. *Write for Bulletin of this* "Sure-Fire" heat-resisting alloy.

CHICAGO STEEL FOUNDRY COMPANY

KEDZIE AVE & 37TH ST

PYRASTEEL for high temperatures

CHICAGO Makers of Alloy Steel for 30 Years

EVANSTEEL for strength

for the legal penalty for failure to adjust and pay the claims filed for such losses within the period fixed by the state statute. The limestone was loaded in three separate open cars and was receipted for by the Southern Railway Company as the initial carrier. This company issued for each car its standard uniform bill of lading at Gaffney.

The shipper sent a letter to the carrier covering the loss of the three shipments, and including a demand for payment at the rate of $2.25 per ton. Each claim was not on a separate piece of paper, but all claims were included in the one letter. Each car was listed separately, with its designated number and the loss of limestone claimed. Accompanying these separately-stated claims were the original invoices, the bills of lading, and the paid freight bills; and the carrier was advised that the three cars of limestone were short in tonnage on account of loss through bolt holes and loose plates in the bottom of the cars. The counsel for the carrier argued that the shipper was not entitled to recover the usual $50 penalty for each of the three claims because only one claim was filed.

The higher court held the carrier liable for the value of the loss of limestone plus the penalties for three claims. This court said:

"In our opinion, it is incorrect to say that the three claims were not properly filed. The appellant [carrier] was given full notice that the respondent [shipper] claimed a loss of limestone from three separate cars, and it makes no difference that these separate claims were all stated in one letter."

Also, with respect to the shipper requesting special kind of cars, the court said:

"This is not a case where the shipper selected or furnished cars for transportation at its own risk. The cars were owned and furnished by the carrier. Even if Campbell Limestone Company, as consignor, did request open cars for the shipment of the limestone and secured them at a lower freight rate, this would not in any sense have excused the carrier from liability for furnishing defective cars with open holes and loose plates in their bottoms from which the limestone escaped."

Shipper Liable for Freight Charges

The terms of every contract of shipment, so far as the service to be rendered and the compensation to be received are concerned, are fixed by a schedule filed with and approved by the Interstate Commerce Commission. Neither the consignor nor the consignee may by agreement modify the terms, and the rates defined by the tariff cannot be varied by contract or by the carrier. For illustration, in *Baltimore & Ohio Railway Company v. Illinois,* 46 N.E. (2d) 144, it was shown that a common carrier filed suit to collect $9,801 from a shipper, a balance of freight charges claimed to be due on a number of shipments of non-metallic materials. During the trial the testimony proved that the bill of lading contained a no-recourse clause signed by the shipper providing that the carrier should not make delivery of shipments without payment of freight, and that the carrier had a right to demand prepayment of charges. Notwithstanding this clause, the higher court held the shipper liable for full payment of the unpaid freight charges, and said:

"Where the carrier manifests an intention to demand prepayment of the charges the signing of the 'no-recourse' stipulation by the shipper is ineffective. The law requires a shipper to pay all the charges in advance if a demand therefor is made by the carrier. Delivery of

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the shipment does not change the primary obligation of the shipper to pay the charges. Where the carrier insists on prepayment of the charges the shipper cannot, by signing the 'no-recourse' stipulation, avoid its obligation to pay all the charges, and if through some mistake all the charges are not collected in advance, the liability of the shipper to pay persists. We are of the opinion that the 'no-recourse' clause of the Conditions of the Bills of Lading was not applicable to the shipments, and that the plaintiff [carrier] is entitled to recover the difference between the domestic rate and the export rate on the shipments delivered within three years prior to the institution of the suit."

Questions and Answers

[Mr. Parker will be glad to answer questions regarding legal problems of PIT AND QUARRY readers. Questions should be addressed to Leo T. Parker, Legal Editor, PIT AND QUARRY.—ED.]

Legal Editor: Frequently we sell to purchasers in our state and these purchasers ship the materials outside the state. Are we liable for payment of state sales tax on these sales?—G. D.

Answer.—Generally a sale made within a state of merchandise subsequently delivered to a purchaser within the state is an intrastate transaction and taxable irrespective of relevant testimony and facts. For example, in *Standard v. Johnson,* 132 Pac. (2d) 910, the court records disclose these facts: A Delaware corporation doing business in California has its head office in San Francisco. The major portion of its products come from sources within the state of California. This corporation sold its products to a purchaser delivery to be f. o. b. Tracy, California, whence it was transported by the purchaser to various destinations outside the state as determined by orders and by "way bill for company freight" issued contemporaneously with the loading. The higher court held that this merchandise was subject to the sales tax in California because the transactions between the corporation and the purchaser were purely intrastate. This court said:

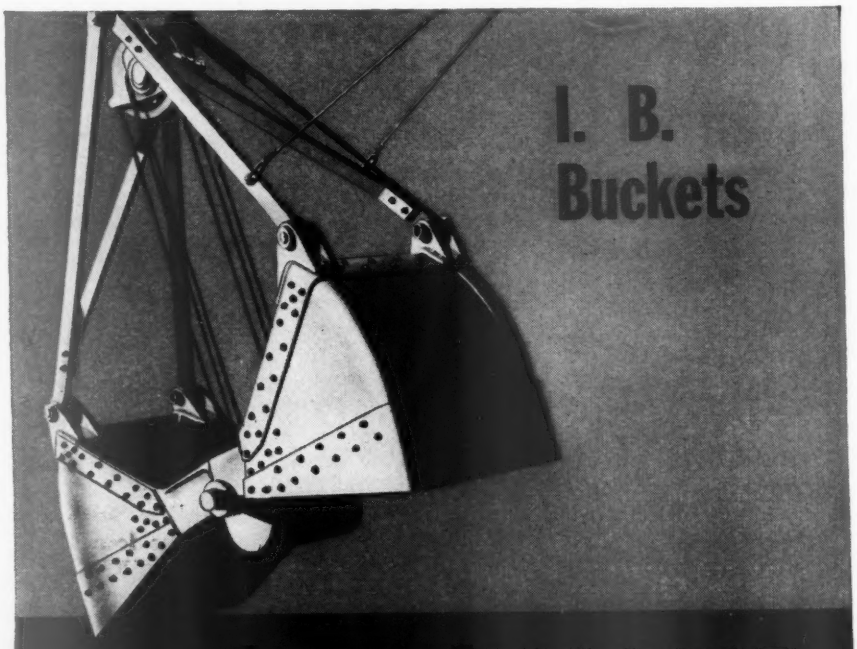
"In the case before us we believe that the sale was a transaction begun and completed within the State of California and was purely an intrastate transaction subject to the provisions of the Retail Sales Tax Act. It is to be noted that orders were given in California and that the contract provided for delivery at points in the state."

* * *

Legal Editor: If an insurance agent knows what buildings are intended to be included and insured in a policy is the insurance company liable in case of a fire loss? Recently we had a loss and the building was not named in the policy although the agent knew that it was intended to be insured.—C. S. & G. Co.

Answer.—Many companies have been forced into expensive litigations, with resultant heavy financial losses, as a result of insurance policies. Many persons and firms hold invalid insurance policies because of their failure to read the policies carefully. Generally speaking, however, an insurance company is liable for contracts made by its authorized agents.

For instance, in *Fremon Company v. Maryland Insurance Company,* 242 N. W. 422, it was shown that a manufacturer conducted its business in a plant consisting of several buildings, two of which were on the east side of a street. The manufacturer held an insurance policy which failed to specify that buildings on the east side of this street were insured, al-



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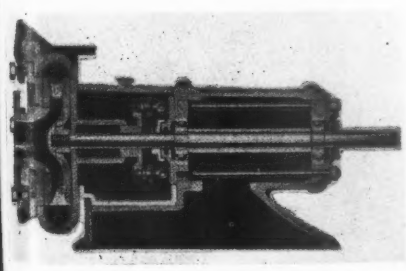
though at the time the policy was issued the official had explained to the insurance agent that the buildings on both the east and west sides were to be insured. When the buildings on the east side of the street burned the insurance company refused to pay the insurance on the grounds that these buildings were not covered by the policy. However, under the circumstances, the higher court held the manufacturer entitled to recover on the policy. Therefore, an insurance salesman has implied authority to represent his employer in regard to matters over which the employer has expressly extended authority and, also, with respect to insurance which he sells.

NEW MACHINERY and SUPPLIES

● Slurry Pump

In pumping cement slurry, destructive eddy currents result from the slippage or leakage which takes place in the clearance between the impeller shrouds and the sides of the pump, and they result from quick changes in velocity or flow direction. Toward the elimination of this difficulty, the Amsco-Nagle Class "S" impeller (U. S. Patent 2,265,448), has been worked out by Amsco engineers. In this design, the clearances between the impeller and the sides of the pump have been increased, first, to establish a more balanced relationship between the design of the impeller and the design of the casing; and, second, to reduce skin friction and its attendant energy loss. These features tend to increase the efficiency of the pump or, in other words, to reduce the horse power used per gallon or pound of material pumped.

The use of this type of impeller in a pump for handling slurry might result in rapid wear, except that in the Amsco design all the clearance areas coverage and diverge gradually, thereby avoiding quick changes in velocity; and that in the absence of sharp exit or re-entrant angles in the clearance areas, there can be no quick changes in direction of flow. Thus eddy currents are minimized or eliminated. Face seals rather than ring seals, furthermore, are employed and, with the adjustable features of the Amsco pump, close clearances, reduced slippage and increased efficiency are maintained.



Cross-section of slurry pump.

The problem of eliminating gland trouble resolves itself into what steps are possible to reduce the pressure in the stuffing box. This pressure in the usual slurry pump is communicated from the volute or casing down through the clearance between the back shroud and the back plate of the pump. Amsco design reduces this by a suitable face seal and by the use of properly designed and adequate relief holes in the back shroud of the impeller. These features tend to throttle the leakage on the back side of the pump and to place the stuffing box in communication with the lowest pressure area within the pump. Thus it is possible to keep the stuffing box under the lowest pressure conditions and if the pressure on the entrance side of the pump is less than atmospheric, the tendency is for air to leak into the stuffing box rather than for slurry to leak out. Usually with this design the introduction of seal water into the stuffing box is unnecessary, although a small amount acts as a lubricant and for that purpose need not be a quantity sufficient to cause objectionable dilution. The relief holes in the back shroud of the impeller are plainly shown.

● Power-Control Unit

The Model HN power-control unit combines a LeTourneau single-drum PCU for bull-dozer operation with a Hyster D4 towing winch. This development makes possible the combination installation of a bulldozer and towing

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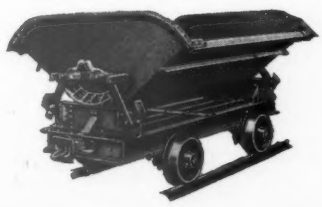

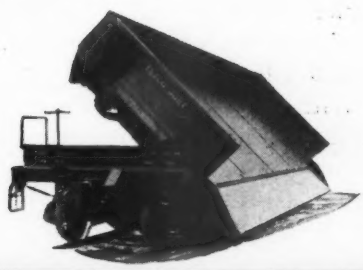

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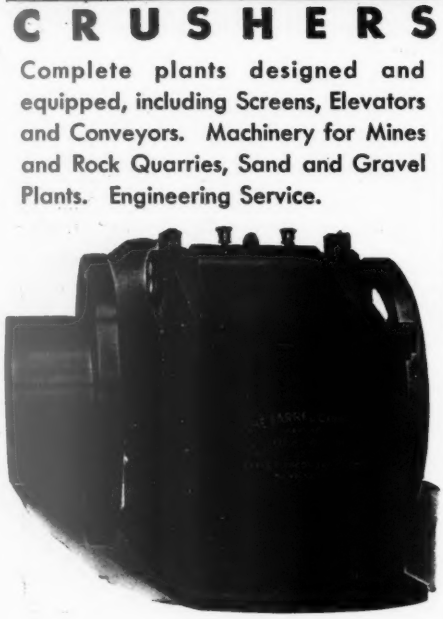

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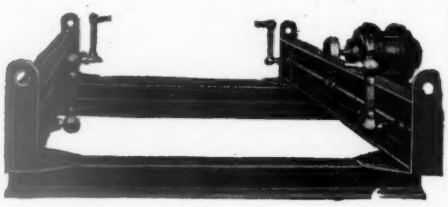

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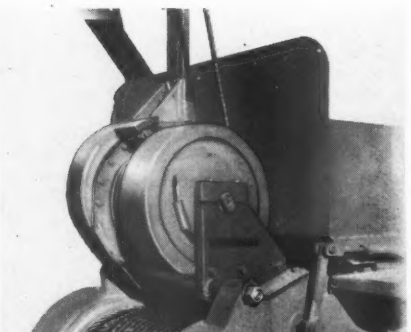


Power-control unit and winch.

winch on the same "Caterpillar" D4 or R4 tractor.

Both Hyster winch and power-control unit are standard, job-proved models combined here into one compact unit. Towing winch and unit can be operated independently or together.

The LeTourneau drum has a speed of 308 feet per minute on the bare drum; the Hyster winch has a line pull of 15,400 pounds and its line speed is 91 feet per minute on the bare drum.

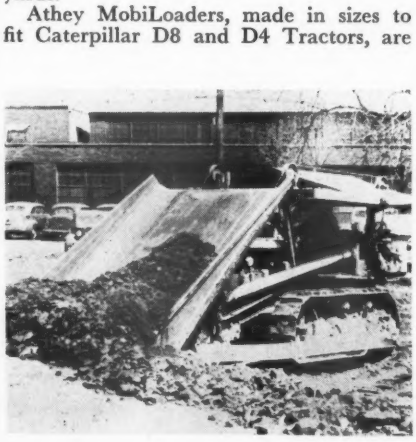
While built primarily for military use, the HN has very obvious advantages for other tractor users who have need for a bull-dozer plus a power winch. Like all other Hyster and LeTourneau tractor equipment, the Model HN is sold through Caterpillar Tractor Company dealers.

● Tractor Loader

The Athey Truss Wheel Company, Chicago, announces an improved model Athey MoliLoader which operates with the Caterpillar Diesel D4 Tractor.

Although simplicity in design is the chief change, the manufacturer states there are numerous improvements over its predecessor model which has been in the field for four years. The new model has increased stability, greater operating range, reduced height to simplify transportation and lower center of gravity. It has a bucket capacity of 1 1/8 cubic yards.

Athey MobiLoaders, made in sizes to fit Caterpillar D8 and D4 Tractors, are



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characterized by their "straight line" loading action. Digging the load at the front, the outfit travels in reverse to the truck or fill and discharges the material overhead.

● Photo-Electro Relay

A new general-purpose photo-electric relay for outdoor use has been announced by the electronic-control section of the General Electric Company. Designated as the Type CR7505-K108, it is for applications requiring rapid and accurate counting, controlling, sorting, or limiting operations. Its contacts control 2 amperes at 115 volts, 25- to 60-cycles, alternating current, or 0.5 ampere at 115 volts, direct current.

In addition to a Type GL-930 phototube, the new relay contains a Type GE-117P7GT pliotron tube. This amplifier tube is outstanding in two respects—its

Photo-electric relay control.

filament operates on full line voltage, eliminating the need for a filament transformer; and it incorporates a diode rectifier which functions when a-c power supply is used.

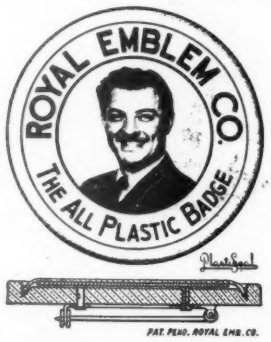
The relay's weatherproof case is equipped with a sun shield and a large, directional lens system to minimize the effect of slanting sun rays. In addition, the lens system increases the relay's sensitivity.

The relay can be mounted in any position and can be adjusted under actual operating conditions, without removing the cover. The chassis can be removed easily from the case for inspection or servicing or, if desired, for mounting with other apparatus in a combination enclosure.

● Identification Badge

An identification badge for war workers which it is claimed will save approximately one ton of much needed metal on every 40,000 badges made, has just been placed upon the market. This all-plastic badge is made of a strong, durable, attractive plastic possessing all the attributes wanted in a badge. It is but ⅛ inch thick and so light that, when attached to any light weight material, it does not hang in an unsightly manner.

Made in two parts—the specially designed, reinforced plastic case, cast by the latest injection method, and the crystal or face. Both of these parts have specially formed edges which, when assembled, fit tightly into one another, and when assembled, become a one-piece unit.



Front and sectional views of identification badge.

The Plasticseal badge is claimed to be completely tamper-proof, the laminated construction of the component parts being so integrated that any attempt to take the badge apart would so completely mutilate the component parts so as to make them entirely unusable.

This badge is made by Royal Emblem Company, New York.

● Motors

A new line of totally-inclosed motors, the most recent addition to its group of Tri-Clad motors, has been announced by the Motor Division of the General Electric Company. Available in both the

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WILL INCLUDE
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Always accurate in diameter.
Concentric ends match correctly.
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Sizes: 4" to 30" in diameter—all types of fittings, connections and fabrications.

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The outstanding performance of this distinctive lightweight pipe on the battle fronts points the way to the solution of many mine-piping problems in the post-war period.

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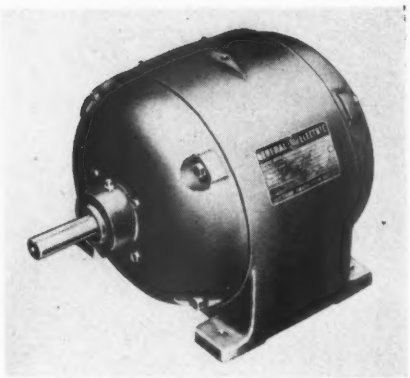
polyphase, 60-cycle, induction type and the single-phase, 60-cycle, capacitor type, the new motors are especially designed for use under conditions where abrasives, chemicals, rain, snow, and excessive dirt are encountered.

These new motors have all the important basic features of the Tri-Clad group. This includes triple protection—protection against physical damage, electrical breakdown, and against normal operating wear and tear.

In addition, all parts of the motor inclosures—frame, end shields, and conduit boxes — are cast iron, thus offering exceptional resistance to rust, corrosion, accidental blows, and rough use. Also, the leads are permanently encased in compound in a cast-in pocket in the stator frame, thus preventing liquids from seeping into the motor. Still further protection is provided in the form of a rotating labyrinth seal, which prevents dirt, oil, or water from entering the bearing housing. The motors are wound with Formex wire.



New totally-inclosed motor.

A NEW BOOK

DEMOCRACY, EFFICIENCY, STABILITY . . . AN APPRAISAL OF AMERICAN GOVERNMENT. *By Arthur C. Millspaugh. 522 pages. Published by the Brookings Institution, Washington, D. C. Price $4.00.*

This book undertakes an appraisal of American government from the point of view of its democracy, efficiency, and stability. The analysis is proportioned and comprehensive, covering political ideas; the different levels, branches, and organs of government; parties, groups, pressure, and propaganda; and influences produced by changing economic, social, and international conditions. The approach is historical, recognizing the dynamic nature of political life, the fact that government is always in process of evolution.

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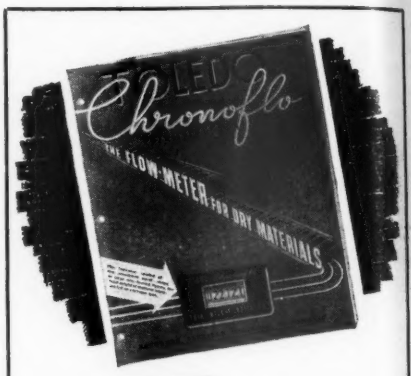

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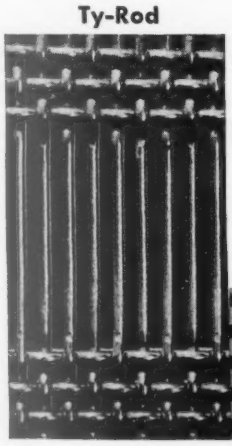

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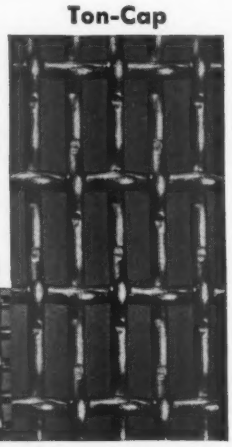

JULY, 1943

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Waterproofing for Unit-Masonary Walls Studied

Building walls in exposed locations are sometimes penetrated by wind-driven rain with subsequent damage to plaster and interior trim. The effectiveness of cement-water paints and of other waterproofings for unit-masonry walls was studied by Cyrus C. Fishburn and Douglas E. Parsons of the National Bureau of Standards, who measured the water-permeability before and after treatment of small wall specimens that leaked when exposed to simulated service conditions. The durability of some of the treatments was measured by again testing the walls after they had been stored outdoors for one or two years.

Cement-water paints were found to be highly resistant to water penetration and were more effective than emulsified resin or oil base paints. The cement-water paint coatings were durable and proved effective as waterproofings after one or two years of exposure, although some of the specimens were so weather-stained that their repainting might have been considered desirable from the standpoint of appearance. On rough-textured concrete-block walls, the cement-water paint coatings were most effective when applied with stiff, fender-cleaning brushes rather than with soft-bristled whitewash or paint brushes. The admixture of fine sand in the first coat of paint applied to walls of rough-textured units, such as cinder-concrete block, was highly effective. Such coatings were durable and contained few or no pin holes. Coatings made of cement-water paint of thin consistency were more permeable than those made from a paint of medium consistency, but heavy applications of a medium consistency paint were less durable than thinner coatings of the same paint. Cement-water paint coatings applied to dry walls were more permeable than similar coatings applied to backings that had been wetted and were damp when painted.

Colorless waterproofing materials were of little or no benefit as waterproofing when applied to walls that leaked badly. Of the colorless materials tested, only one was effective, and walls treated with it were highly permeable when again tested after they had been exposed outdoors. The only effective and durable waterproofing treatment for brick walls that did not change the appearance of the walls, was repointing or grouting of the face joints.

Bituminous coatings applied to the inside, unexposed, faces of the specimens were ineffective as waterproofings and were badly blistered after a test exposure lasting one day. Brush coatings of Portland cement and sand were more effective than bituminous coatings, but were not as effective as trowel coatings of cement and sand prepared with or without admixtures of powdered iron and sal-ammoniac (iron waterproofing).

Baker Pipe Plant Sold to Thomas Company

The Baker Concrete Pipe Company has sold its plant at Oklahoma City to the Thomas Concrete Pipe Company of Oklahoma City and Ada, Oklahoma.

The new owner has not announced whether it will continue to operate the newly-acquired property or move the equipment to another location.

Universal Supplies Pipe for Ordnance Project

Considerable quantities of concrete pipe were supplied by the Rochester and Syracuse plants of the Universal Concrete Pipe Company for the new Seneca Lake Ordnance Depot near Romulus, New York.

Nearly 20,000 feet of piping in sizes up to 36 inches in diameter were produced and delivered to the job.

The Duck Island Gravel Company of Canton, Illinois is now solely owned by Oscar Linn, he having purchased the interest formerly held by his partner, George R. Barton.

Tips on Maintenance for Ready-Mix Operators-III

another P-Q exclusive

IF the recommendations for maintenance of truck-mixer and agitator bodies for ready-mixed concrete had to be boiled down to the fewest possible words, the words would be Clean, Lubricate and Keep in Adjustment.

The units should be kept scrupulously clean inside and out, free from all adherence of concrete and mortar. Lubrication should be complete, periodic and conscientiously performed. Cleaning and lubrication take plenty of elbow grease and time; they cost money and it is a daily, never-ending job, but the cost involved pays big dividends in lower up-keep costs, the prevention of breakdowns and the consequent loss of use, and an attractive appearance of the equipment which always enhances the impressions of the purchasers of concrete, the public and everyone connected with the operations. Adjustment of the equipment will help avoid excessive wear of parts and insure continuous and efficient operation.

Keep the Equipment Clean An easy method of preventing the adherence of concrete and mortar to the outside of the unit consists of spraying with a light, colorless oil (a paraffine oil known as form oil) at the beginning of each day's work. This method has been used by many ready-mixed-concrete manufacturers with excellent results. The oil makes it possible to easily and quickly wash off the concrete and mortar at the end of the day and at the same time helps to protect the paint. A small paint spray machine is adequate for applying the oil and very little time is required to coat the outside of the unit.

The inside of the truck-mixer or agitator drum presents a more difficult cleaning problem. The surfaces can not be oiled to prevent adherence because of contamination of the concrete. There is no panacea or short cut to keep the inside of the drum, the blades, the water outlets and other fittings clean. Frequent washing out with wash water, preferably after every load, will help. At the end of the day's work the introduction of several hundred pounds of gravel or stone into the wash water to act as a scouring agent while revolving the drum makes the cleaning job easier. After all that can be accomplished by washing and scouring it is still necessary to use a putty knife or screw driver and a high-pressure water stream to get into the corners and crevices to remove all traces of mortar. If this is not done daily, the mortar and concrete harden and provide a rough surface to which more concrete will adhere and ultimately build up to the point where it interferes with the drum capacity and mixing efficiency. When that happens, a major chipping or drilling job is required to get the drum clean. Even then the results are not comparable with those obtained from daily thorough cleaning.

Keeping the seats of the charging and discharge doors clean at all times is imperative to allow tight closing and thus avoid leakage, also to prevent warping of the doors when they are screwed up tight.

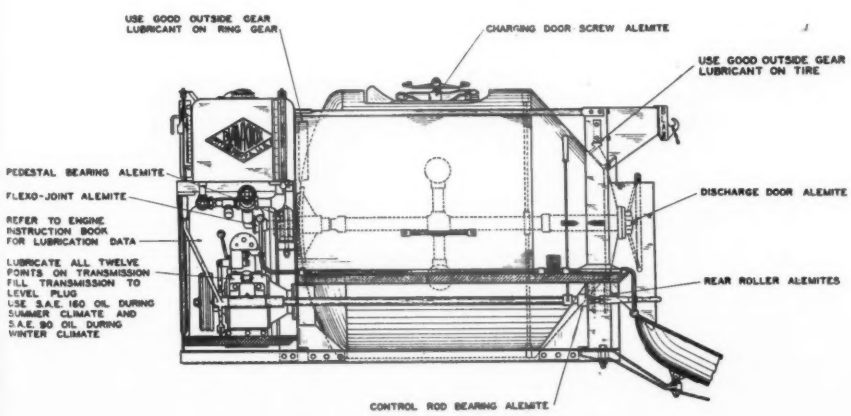
View of concrete-lined wash-out pit which receives washings from truck-mixers and agitators. Pit measures 75 feet long, 15 feet wide and 4 feet deep.

Particular attention should be given to clean the water line from the water-measuring tank or flush tank to the drum. The water outlet or bell should be kept free of mortar and the rubber diaphragm should be flexible with a clean seat so that mortar can not back up from the drum into the pipe line. Scraping the diaphragm seat frequently with a screw driver is a good way to keep it clean. It is advisable to dismantle the water outlet and piping occasionally to make sure that it is not in danger of clogging shut.

One large operator stresses the cleaning of truck-mixers and agitators to the point where every unit is washed inside and outside with a high-pressure hose after every load. This procedure has been going on for years and is considered invaluable in keeping the equipment clean and in prime operating condition.

Incidentally, many operators are troubled with the problem of disposal of the washings which include cement, sand, gravel and stone. Discharging into sewer lines eventually causes them to block up. The most practical solution is the provision of a concrete-lined sump pit with a drain outlet to take off the free water after the heavier ingredients have settled. The sump pit has to be cleaned out from time to time by means of a crane and clam-shell bucket.

Adequate space should be provided for washing operations so that


USE GOOD OUTSIDE GEAR LUBRICANT ON RING GEAR
CHARGING DOOR SCREW ALEMITE
USE GOOD OUTSIDE GEAR LUBRICANT ON TIRE
PEDESTAL BEARING ALEMITE
FLEXO-JOINT ALEMITE
REFER TO ENGINE INSTRUCTION BOOK FOR LUBRICATION DATA
LUBRICATE ALL TWELVE POINTS ON TRANSMISSION FILL TRANSMISSION TO LEVEL PLUG USE S.A.E. 160 OIL DURING SUMMER CLIMATE AND S.A.E. 90 OIL DURING WINTER CLIMATE
DISCHARGE DOOR ALEMITE
REAR ROLLER ALEMITES
CONTROL ROD BEARING ALEMITE

Manufacturer's lubrication chart for a truck-mixer.

By ARTHUR A. LEVISON

Manager, Construction Equipment, Blaw-Knox Division, Blaw-Knox Company

work at the wash rack can proceed without interfering with other functions of the ready-mixed plant and its personnel. The truck chassis should be given the same cleaning attention as the concrete bodies.

The job of keeping the truck-mixers and agitators clean should be definitely assigned to the drivers as part of their required daily duties and the time they spend in washing and cleaning, of course, should be paid for so as to avoid the usual quick, hit-and-miss clean-up job done after working hours. Occasional inspection, especially inside the drum, provides a check on the thoroughness of the cleaning and should avoid excessive building-up with concrete. A good washing job takes about 30 minutes, except for the inclined-axis truck-mixers which may require more time because of closer blading in the drum and the occasional tendency of concrete to gravitate to the lower end of the drum.

Varying the rate of discharge from truck-mixers or agitators by the control of the discharge-door opening is bad practice and should be avoided. The discharge should be controlled by the use of the clutch. Throwing the clutch out of engagement will stop the drum from turning in the discharge direction and thus stop the flow of concrete. When the door is used for controlling the discharge of concrete, it causes concrete to leak down on the drum rollers and the track on which these rollers ride, which causes excess wear to the track and rollers. If the discharge is controlled by means of operating the clutch, the operator will have a cleaner machine and less maintenance.

Keep the Equipment Lubricated

Practically all manufacturers of truck-mixers, agitators and truck chassis supply lubricating charts for their respective equipment. Recommendations for the grade of lubricant best suited and the frequency of lubrication are also included.

The most popular method for insuring regular lubrication is through the use of a record chart kept in the plant office. Usually the truck chassis is scheduled for lubrication on the basis of the miles traveled, while the mixer body is scheduled on the basis of the hours of operation. Records are kept of the oil changes required for the truck-mixer engine and truck-engine crankcases as well as for the transmissions. Some operators during periods of peak operation arrange to have the lubrication, oil changes, filling of radiators with water and refueling with gasoline taken care of at night so as to avoid the loss of operating time during daylight hours. Drivers of truck-mixers as a rule (except where only a few units are involved) are not charged with the duty of lubrication, oil changes, etc. However, if they find during the course of a day's work that some point requires lubrication, they should take care of it without delay. For example, the clutch throw-out collar may require greasing twice a day during steady operation.

A 4-cubic yard inclined-axis truck-mixer delivering concrete for building foundation walls.

Lubricating facilities should include a power-operated machine for pressure greasing. In lieu of this some operators use a foot-power operated pressure - greasing unit. This, together with hand grease guns, answers most of the requirements.

All types of truck-mixers except one are driven by means of a driving pinion on the output shaft of the transmission engaging a large ring gear fastened to the front end of the mixer drum. The pinion and gear should be lubricated with a heavy oil to prevent wear. However, this part of the truck-mixer mechanism requires special caution. The gear and pinion are only partially housed and there is danger of cement dust, sand, etc., mixing with the lubricant and forming a grinding compound which will greatly accelerate wear of the pinion and gear. The way to avoid this condition is to wash off the lubricant and foreign materials from time to time with the high-pressure hose and then replenish the lubricant. Some makes of truck-mixers include a self-oiling device for continuous oiling of the ring gear and pinion. Heavy grease should not be used because of its greater power for holding grit and abrasive materials.

Care must be taken not to over grease the flexo-joint connection too much because excess grease will clog the pipe leading from the water tank to the mixer drum.

If the discharge door is screw-operated for opening and closing, the screw should be kept packed with grease. If the screw still works hard after greasing the door, the screw should be removed for cleaning out any accumulation of mortar that may have got by the packing seal. If tightening the packing seal does not keep the mortar out, then a new packing should be installed.

A sample of a manufacturer's lubrication chart for a truck-mixer is reproduced on page 139 and, aside from the truck-mixer engine, it will be noted that the lubricating points are relatively few and simple. It should not take more than about 20 minutes to do the normal greasing job on a truck-mixer and there isn't an investment that will pay greater dividends in low up-keep, satisfactory and continuous operation, and reduction in wear.

Too much emphasis can not be placed on the necessity to *clean* and *lubricate* regularly. A little planning and the establishment of a routine at the ready-mixed plant are the essential steps in getting this part of the program under way.

Keep the Equipment in Adjustment

Next in importance to keeping the units clean and lubricating them is the matter of adjustment of critical parts of the equipment. The vibration and twisting of truck frames over rough roads, the sudden shocks to the mechanism as the direction of drum rotation is reversed, and the normal wear through continued use make it essential that

FORM-PP
TRUCK NO._____
CARD NO._____
TYPE TRUCK BODY TRUCK INSPECTION REPORT YEAR

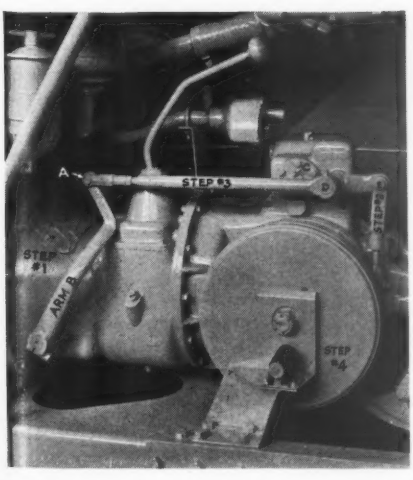
Mechanic will place initial and date in proper column. If mixer motor encircle initial and date.

LUBRICATION	Chassis	STEERING	Adjust	GENERAL	Radiator
	Oil Change		Toe In		Axles & Seals
	TRANS-Diff.		Tie Rod		Water Pump
	Front Wheels		Gear		Tire Inflation
	Rear Wheels	TIGHTENING	Chassis		Fan Belt
	Oil Filter		Body		
	Clutch		Axle Nuts		
	Water Pump		Wheel Bolts		
	Mixer	MAJOR	Engine		
MOTOR	Tune Up		Clutch		
	Spark Plugs		Transmission		
	Valves		Differential		
	Carburetor		Drive Shaft		
	Gasline		Universal Joints		
	Vacuum Tank	MIXER BODY	Adjust		
	Fuel Pump		Chain & Gears		
	Compression		Oil Change		
ELECTRICAL	Battery		Clutch		
	Starter		Body Rollers		
	Generator		Thrust Rollers		
	Distributor		Power Take-off		
	Light-Wiring		P.T. Studs		
	Horn		Hatch Door		
BRAKES	Adjust		Discharge Door		
	Lining		Discharge Chute		
	Cables		Brake		
	Booster				
	Fluid				

Truck chassis and truck-mixer service-inspection report. Above the inclined line in each block the mechanic inserts the date of the operation and below he enters his initials.

points of adjustment be checked and that readjustment be made as required.

The adjustment of the operating controls and control linkage is the most important item in this category of maintenance. In some truck-mixer designs one control lever operates the main clutch, the shifting mechanism which revolves the drum in the mixing or discharge directions, and the brake which holds the drum stationary when reversing the direction of rotation or stopping the discharge of concrete from the drum. A control mechanism of this type is adjusted at the factory to give split-second coördination of the three functions named, and for continued satisfactory operation the adjustment must be carefully maintained.



Close-up view of controls for operation of engine clutch, brake and reversing direction of rotation of drum. See text for step-by-test adjustment of controls.

On some of the later-model truck-mixers and agitators the engine clutch has a separate control and the usual method of operation with this design is to engage the engine clutch when work starts and allow it to remain engaged all through the day. If the truck-mixer engine is allowed to run continuously, the need for throwing the clutch in and out is eliminated.

One type of truck-mixer transmission includes a sliding gear for reversing the direction of drum rotation; another type uses two multiple-disk clutches running in oil in the transmission housing.

As an indication of the type of adjustments required, a four-step procedure is outlined in the following paragraphs for the sliding-gear type of transmission with single-lever control of the engine clutch, reversing and braking. While the adjustments described may not apply in their entirety to other designs of truck-mixer mechanism, some portions do apply to practically all designs and an idea will be gained of the relatively small amount of work involved. Follow the description of adjustments with the accompanying illustration.

Adjustment of Operating Controls

Step 1. — The clutch between the engine and transmission is a friction clutch of the dry type. It is adjusted by pulling out the adjusting lock pin and rotating the floating plate in a clockwise direction to tighten the clutch or in a counter-clockwise direction to loosen the clutch. The clutch should be tightened or loosened one notch at a time and the adjustment should be such that a distinct snap is felt when the clutch is engaged. This causes an over-center action of the links and prevents the clutch from jumping out. When making the clutch adjustment, remove pin "A" and operate arm "B" to obtain the correct setting.

Step 2.—Then adjust the link between the operating control lever and the shifting mechanism. Note that the lower portion of the control lever terminates in a roller which works on an odd-shaped cam. The high part of the cam operates the

A 1¾-cubic yard open-top mixer on a pavement-widening job.

Four-cubic yard truck-mixers delivering concrete for highway construction. These are inclined-axis units mounted on three-axle chassis.

brake. With the control lever in the position shown in the illustration the length of the vertical link is adjusted so that the three points on the shifter mechanism "C," "D" and "E," lie in one horizontal plane. This adjustment when properly made will make the gears mesh fully and properly and will avoid undue wear of the sliding gears and the bevel gears which they engage.

Step 3.—This is the adjustment of the link between the shifter mechanism and the friction-clutch arm "B." With the shifter mechanism in neutral (and points "C," "D" and "E" in one horizontal plane), adjust the link so that the clutch is entirely free and disengaged. A slight movement of the operating control lever should cause the clutch to "drag." This adjustment is critical, because if the clutch engages too soon the gears will clash, if too late, the gears will be difficult or impossible to shift. Increasing the length of this link makes the clutch engage sooner; shortening the link delays the clutch action.

A 2½-cubic yard horizontal-axis truck-mixer mounted on cab-over-engine chassis, delivering concrete for sewer construction.

Step 4.—The brake is adjusted by turning the adjusting screw one notch at a time. This adjustment must be made with the roller at the lower end of the operating control lever not in contact with the higher point of the cam on the brake arm. The brake should be tight enough to hold the drum stationary when shifting rotation from one direction to the other.

Each of the links mentioned above has a screw-type adjustable clevis, and by removing the pin connection the length of the link can easily and quickly be altered to suit the necessary adjustment.

If the above adjustments are properly made, the operator will be able to reverse the direction of rotation with only slight effort, wear of the gears will be greatly reduced, and better control of the discharge will be obtained.

Throttle Control Throttle controls become loose due to vibration. This control should be adjusted to stay fixed for the engine speed selected. Incidentally, operating the truck-mixer engine at low speeds for any length of time will cause the engine to become foul and rapidly lose its efficiency. This practice should not be permitted.

Adjustment of Flexo-Joint in Water Line The flexo-joint gasket is used to seal the connection between the moving and stationary portions of the pipe line leading from the water-measuring tank to the drum. If the adjustment is made too tightly, the gasket will be destroyed in a short time. The collar should be pulled up just enough so that there will be no leakage of water, and it should not be pulled up beyond this point. The flexo-joint joint should be dismantled and kept clean, also greased, to prolong its life and have it function efficiently. When installing a new flexo-joint gasket, if it is first coated with powdered graphite this will prevent the gasket from tearing and prolong its life. If leakage occurs, one or two wrappings of ¼-inch diameter flax gasket pulled up fairly snug has proved effective in stopping the leak.

Gear on Truck-Mixer Drum If the large ring gear, which is fastened to the truck-mixer drum, and the driving pinion on the output shaft of the transmission show accelerated, undue wear, an investigation should be made immediately because this may lead to a costly repair job. If the wear is not caused by a mixture of grease and grit adhering to the gears and acting as an abrasive, then look for misalignment of the truck-mixer drum on its frame or improper assembly of the large ring gear on the mixer drum.

Mounting of Truck-Mixers and Agitators In numerous cases insufficient study has been made of the mounting of truck-mixers and agitators on the truck chassis selected. The considerations involved are not complex

A 3-cubic yard inclined-axis truck-mixer working on concrete-pavement construction.

A 2-cubic yard inclined-axis truck-mixer working on foundation construction.

and frequently incorrect mountings can be rectified.

The matter of weight distribution between the front and rear axles is highly important to the operation and maintenance of the truck. Units have been observed in the field which have too great a proportion of the weight on the front axles, making the truck difficult to steer and dangerous to operate. Other units have too great a concentration of weight on the rear axle with a tendency to lift the front wheels from the road when traveling up grade and imposing too much strain and wear on the rear tires.

Such unsatisfactory mountings can be corrected after a proper study of the weight and center of gravity of the truck-mixer body and the pay load with respect to the truck chassis. Most two-axle trucks have the weight of the bare chassis equally distributed between the front and rear axles. When the truck-mixer or agitator is mounted on a conventional two-axle chassis, the aim is to have 25 per cent. of the weight of the chassis, body and pay load on the front axle and 75 per cent. on the rear axle. For a two-axle cab-over-engine chassis the distribution is approximately one-third of the gross load on the front axle and two-thirds on the rear axle. For three-axle trucks the center of gravity of the body and pay load should be midway between the two rear axles. Manufacturers of truck-mixers and agitators issue mounting diagrams for the guidance of their customers. It is advantageous to follow these recommendations.

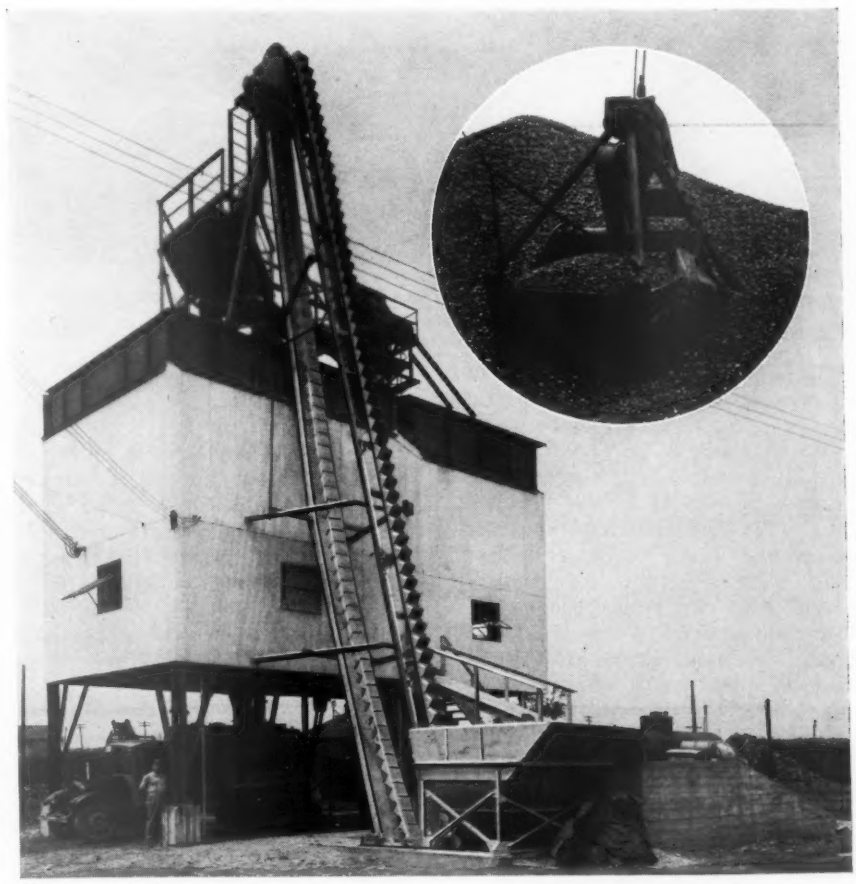
Good practice indicates the desirability of a 10- to 12-inch space between the front of the truck-mixer body and the back of the cab for access in servicing and repairing the truck-mixer engine and transmission. A hard wood strip of ¾-inch or greater thickness should be inserted between the truck-mixer sill members and the chassis frame. Truck-mixer manufacturers furnish clamps for fastening the unit to the chassis frame without drilling holes in the frame members. These should be kept tight at all times. A tack-welded clip between the truck-mixer sills and the chassis frame will prevent longitudinal shifting of the mixer.

It would be good to examine the truck-mixer and agitator units already in service with a view toward obtaining the best mounting possible, especially when the truck chassis are to be renewed or changed.

Overloading is a common practice among ready-mixed-concrete manufacturers. As a rule, the truck-mixers and agitators are designed to take the extra strain of overloads. The same is not true of the chassis in many cases, and tires, springs, rear ends, etc. suffer because of the overloads imposed on them. Staying within the bounds of the allowable maximum load for the truck chassis is by far the safest course to follow, especially in these times when new trucks are so difficult to obtain. Mention should be made of the additional mixing time required to obtain a satisfactory mix with overloads. This factor defeats the anticipated economy of overloading on the shorter hauls.

A remarkable demonstration of the staying powers of Yough silica brick was completed recently at the Clay Center, Ohio, plant of the Kelley Island Lime & Transport Company, according to the General Refractories Company, Philadelphia.

The announcement was based upon an engineering report containing a complete history of a test kiln at the Kelley Island plant. This report revealed that arches built of Yough silica brick were still in almost perfect shape 35 months after the test kiln was fired up and after the kiln had been in actual production for 32 months of that period.



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The CONCRETE MANUFACTURER

Block Maker, Forced from Old Site by War-Plant Expansion, Erects New and Modern Plant

The attractive new plant of Cinder Products, Inc. with part of the block-storage yard in the foreground.

THE war and its effect on our way of living and doing business has created many problems for those in business but few quite as drastic as that which recently confronted the firm of Cinder Products, Inc. This pioneer cinder-block producer had been in business since 1926 with a plant, on property leased from the Pollak Steel Company, in Carthage, a suburb of Cincinnati. Early in 1942 Edward Johnson, president of the company, was notified that the steel company's property had been sold to the Defense Plant Corporation and that he had 60 days in which to move to another location. Because of a month-to-month cancellation clause in the lease this had to be done at the company's expense.

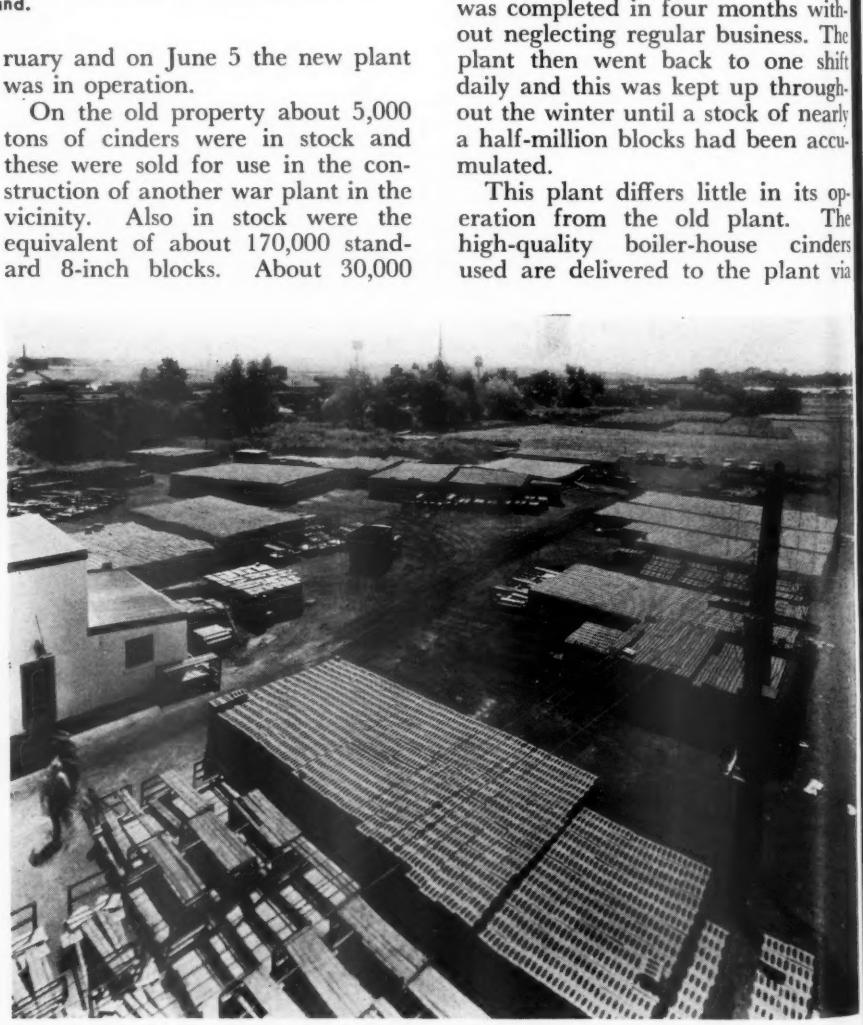
Mr. Johnson at once began a search for a property which had to be centrally located with respect to demand and near a railroad so cinders could be shipped in. It had to be in a zone where factories are permitted and where no zoning changes were likely to be made in the future. Five acres was the minimum area required for the plant and adequate yard storage. After looking at 30 sites the present one on Este Avenue in Elmwood Place, another suburb, was selected. A siding was at once installed and the property was cleaned up and filled in with cinders. Ground for the new plant was broken late in February and on June 5 the new plant was in operation.

On the old property about 5,000 tons of cinders were in stock and these were sold for use in the construction of another war plant in the vicinity. Also in stock were the equivalent of about 170,000 standard 8-inch blocks. About 30,000 blocks were sold during the 60-day period of grace, but all the others had to be transferred to the new location. The old plant buildings were torn down and removed. Only the wood and corrugated metal were salvaged for use in the new plant.

Because the company is selling chiefly to war industries its priorities were high enough for the purchase of other materials necessary to build this plant. Cinder-blocks were, of course, used for the main part of the plant and only the roof and bin enclosures are built of wood. In order to conserve space the offices and the rooms for casting sills, lintels and specials are located over the 70- by 170-foot kiln building. Most of the equipment was brought from the old plant and included a Besser tamper brick machine and a Besser standard tamper. A slightly-used Besser Victory tamper was purchased to augment this equipment.

No time was lost in getting the new plant into two-shift operation in order to fill an order for over a half-million concrete blocks (8-inch equivalent, for a War Aid Depot being built near Cincinnati. This order was completed in four months without neglecting regular business. The plant then went back to one shift daily and this was kept up throughout the winter until a stock of nearly a half-million blocks had been accumulated.

This plant differs little in its operation from the old plant. The high-quality boiler-house cinders used are delivered to the plant via



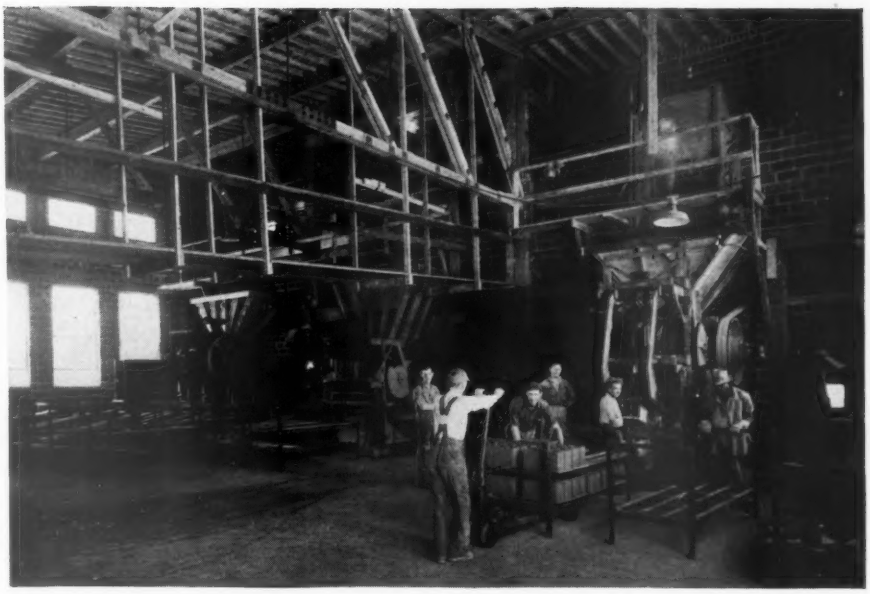
This view from the top of the plant shows how various types and sizes of blocks are kept segregated.

the Baltimore and Ohio Railroad and can go direct to the plant or to stock piles. Sand and gravel are received either in cars or trucks and are fed to the plant on a separate conveyor. All the rehandling is done by a Byers gasoline crane with a ¾-cubic yard clamshell bucket and trucks are used to feed the stock-piled aggregates to the plant. The cinders are passed through primary and secondary crushing stages. As they are screened a magnetic separator removes most of the small amount of iron in them.

The aggregates are batched into a 42-cubic foot mixer mounted on a car which is moved into position over any of the three block machines by means of a hoist and cable. Cement, which is received by railway, is elevated to the mixer floor, where there is storage capacity for 600 barrels. Concrete can also be discharged from this mixer into barrows, which are wheeled over a runway to the rooms where sills and lintels are made. These are hand tamped in wooden forms. As yet no joists have been made.

The brick machine is capable of making 38,000 bricks in eight hours. Each of the Besser plain-pallet strippers makes about 6 standard block per minute. Chase racks are used and, when loaded, are hauled into the kilns with hand lift trucks. When the blocks are cured the racks are hauled to outdoor storage by an old Fordson tractor which has been equipped with a hydraulic lift.

According to Mr. Johnson, this company was the first in the Cincinnati area to produce cinder blocks and, until the Straub patents expired in 1934, was the only one to make them. Because of the enviable reputation these blocks have built up in this area, the Straub name continues to be featured in the company's advertising and publicity releases. Mr. Johnson has always been a great believer in the value of publicity and has advertised his product extensively in publications going to architects and builders. Advertising circulars are also sent out at frequent intervals. No salesmen are employed as all the sales in Greater Cincinnati are made through building-material dealers. Some direct sales are made outside this territory and these are handled by Mr. Johnson, who personally supervises sales, operations, advertising, etc. The company is also the exclusive distributor in this territory for the products of the Master Builders Company whose products it recommends to its block customers for use in the mortar and paint used in conjunction with them.



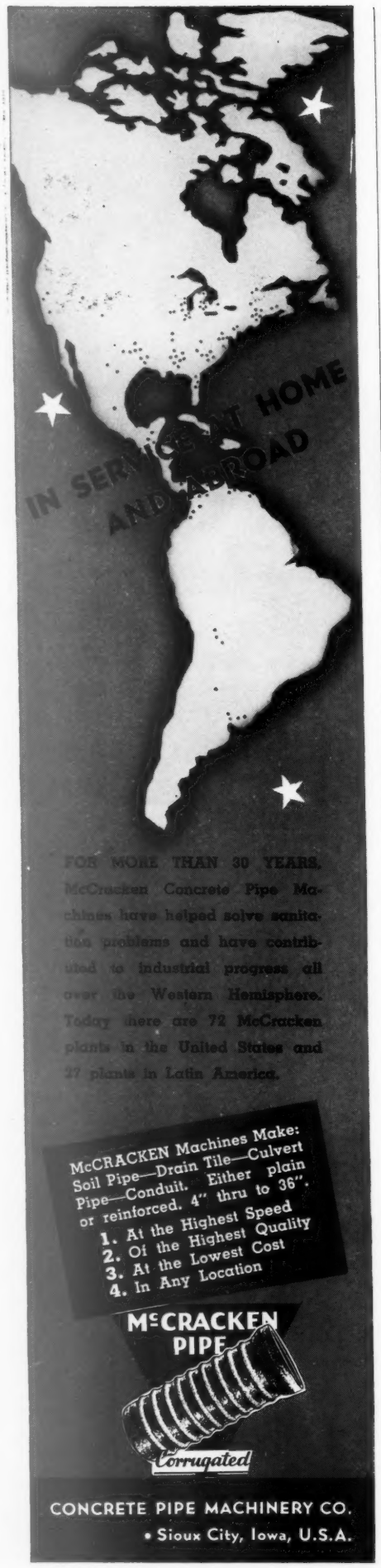
In this view are shown the brick machine and the two block machines. Overhead is the movable mixer.

Most of the cinder blocks produced are used for backing up clay bricks. Mr. Johnson says that since 1932 the company has supplied about 80 per cent. of the back-up used in this territory. Formerly clay tiles had been widely used for this purpose. Very few sand-and-gravel concrete blocks were made until 1942, when some government orders called for them. In building the new plant measures were taken to make possible the quantity production of either type of blocks. The concrete blocks are being used chiefly for the foundation of frame buildings.

In 1941 the company produced more than 1,500,000 standard 8- by 8- by 16-inch cinder concrete units alone out of over 2,000,000 8- by 8- by 16-inch equivalent. These were used for back-up in over 3,000 residences and in many other structures. Most of these were sold to about 300 active builders in this area, few of whom are now in business. During the latter part of 1941 and in 1942 the company's products played an important part in the expansion of Cincinnati's machine-tool manufacturing industry which has been so vital a part of our war effort.

Single and double cinder bricks are made, but these are not selling as rapidly at present as they were a few years ago, when numerous whiskey warehouses were being built. These buildings required solid load-bearing walls and were built with facing of double clay bricks backed up with double cinder bricks. The latter were also used extensively for stair and elevator wells and fire walls. The cinder bricks were preferred because of their light weight and high-insulating value and because their toughness reduced the

One of the important war plants in the Cincinnati area for which this plant has supplied blocks.



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danger of breakage when barrels were being moved.

Although high-early-strength cement is used most of the time in order to get maximum output, no products are sold until they are 28 days old. High-pressure steam-curing is not considered necessary in this plant and the kilns have been heated by salamanders. Equipment for low-pressure steam curing will soon be installed.

The ¾-cubic yard crane which stock-piles and reclaims aggregates.

All blocks must meet the requirements of the Cincinnati Building Code, which far exceed those of any Federal specifications. The block supplied for the War Aid Depot actually had 7-day strengths double the Federal requirement of 1,000 pounds per square inch at 28 days.

The cinders used are said to be the only ones in this territory which can meet the company's rigid specifications. A typical chemical analysis follows:

	Per Cent.
Loss on Ignition	1.28
Silica ($Si\ 0_2$)	50.90
Aluminum Oxide ($A1_20_3$)	25.44
Iron Oxide (F_20_3)	9.20
Calcium Oxide (Ca0)	.79
Magnesium Oxide (Mg0)	.58
Sulphur (S)	.05
Undetermined	11.76

Activity Continues on Nebraska War Plants

George K. Werner & Son of Clay Center, Nebraska, are active this year in supplying the war demand for aggregates which continues with little let-up in that area.

The company has six portable units in operation and uses 24 of its own trucks for hauling materials. Deposits have been worked at a dozen or more locations, including Kearney, Grand Island and North Platte. Combined capacity is 1,500 tons per day, George K. Werner reports.

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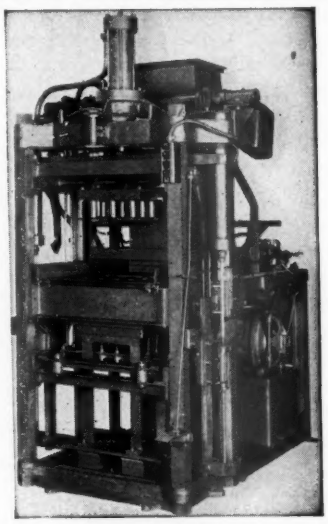

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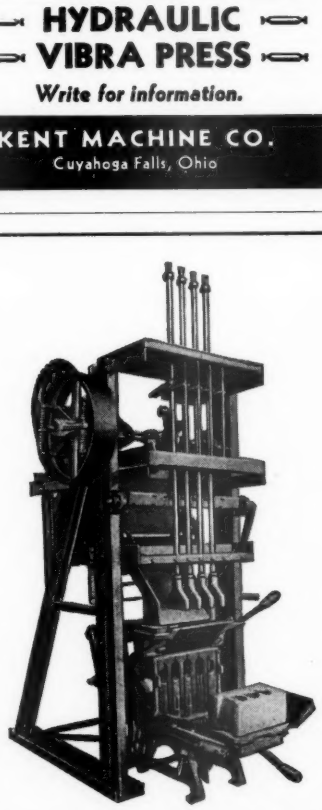

Recognized Everywhere

The Hobbs Jr. Face-Down Block Machine is recognized everywhere as the great general purpose machine of the concrete-products industry. Famous for its wide range of sizes and the variety of blocks it can produce. As illustrated, it is equipped with striking and finishing device, shown under the floor-type tamper and with power feeder.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Jolt-crete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

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1191 Fairview Ave. Columbus 8, Ohio

Proper Handling of Mixer Wash Water in Ready-Mixed Concrete Operations

another P and Q exclusive

THE necessity of frequent moisture tests and accurate compensation for the free water carried by aggregates has become generally recognized as essential if concrete quality is to be controlled and variations in strength and workability kept at the minimum. With the development of batching methods capable of controlling these variables within close limits the problem of control of the wash water assumes greater proportions. Experience has shown that when aggregate moistures are accurately controlled the most vicious remaining variable has to do with the use and the disposal of wash water.

Concrete mixers, if not washed out frequently, rapidly lose efficiency due to accumulations of hardened concrete on the sides and blades of the drum. Furthermore the water lines are apt to become plugged with hardened sediment, if not flushed often during use. It is to guard against these difficulties that most ready-mixed-concrete producers require their drivers to wash out after each load. While the necessity, under some conditions, of washing out after each load is open to debate all producers are probably familiar with conditions such as hot-weather operation, use of high-early-strength cement, or relatively rich mixes when it was absolutely necessary to wash out after every batch.

Since the wash water after being used contains an appreciable quantity of cement as well as some sand and coarse aggregate many producers feel that it should not be wasted but should remain in the drum and thus become part of the following batch. It might be mentioned here that while there are no authoritative data to support the contention that the use of the wash water adds to the strength of the concrete, it has been proved that there is an appreciable loss of material when the wash water is dumped after each load; in one investigation this loss averaged 2.7 per cent. It is apparent, however, that unless the quantity of wash water used and left in the drum is accurately known variations from batch to batch will be inevitable. Because of the difficulties of accurately checking the amount of water left in the drum many producers (and some specifications) require the wash water to be dumped before the mixer is used for a subsequent batch. This practice presupposes the existence of a place where the wash water can be dumped, which is not always the case. Even when a wash-out place is available, a variable human element is involved since this important operation must be left to the driver, who may or may not take the time necessary to be sure that all the water is removed from the drum.

It is clear that no matter what procedure is used to handle the wash water there is always the distinct possibility of each truck going under the bin with anywhere from no water to 20 or 25 gallons already in the drum. Is it any wonder that confusion, errors, and delays result?

Obviously then it is to the ready-mixed-concrete manufacturer's advantage to standardize the procedure for handling the wash water so that errors due to this cause are less likely to happen. Just how the wash-water problem should be handled is of course an individual problem for each producer, since it depends not only on local conditions but is intimately tied up with the batching procedure. In other words time and money well spent in eliminating variations in grading or moisture content can be largely nullified by a careless wash-out procedure. A brief discussion of batching, with emphasis on the methods of introducing the water into the mix, is pertinent.

By W. R. MILLER

For convenience in this discussion let us consider the water used in transit-mixed-concrete operations as being divided into four different classifications as follows:

1. *Contained Water.*—This is the free water carried by the aggregate, the amount of which is determined by moisture tests and compensated for in batching.

2. *Added Mixing Water.*—This is the water added to the mix which, with the contained water, constitutes the total mixing water.

3. *Tempering Water.* — This is water carried in a separate tank on the mixer truck for emergency use. It should be emphasized that this is not figured in as part of the mixing water and is only used in emergencies, as when the mixing is necessarily continued for a longer period than expected, causing the concrete to loose placeability.

4. *Wash Water.*—This is extra water carried in a tank for washing out the mixer drum after the batch of concrete has been discharged.

There is a growing trend toward placing the added mixing water directly into the drum of the mixer along with the other ingredients for which there are several reasons. First, it permits accurate measure-

Mirror outside of bin which informs operator of the presence of water in drum as the truck-mixer prepares to load.

ment of the water by the weighman under the direct supervision of the inspector and relieves the driver of this responsibility; second, it eliminates the bulking which sometimes takes place making it necessary to rock the drum in order to consolidate the batch; third, it places the responsibility for the water in one man, the weighman; and, fourth, since most mixers are equipped with two-compartment tanks, it makes it possible to use one of these for tempering water and the other for wash water.

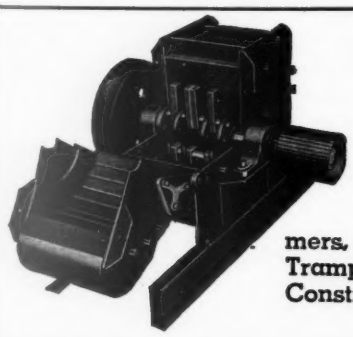
Usually the smaller tank is used for wash water and the larger tank for tempering and added mixing water, if the latter has not been placed directly in the drum at the plant. When accurate control is maintained and the added mixing water is placed directly in the drum, it is sometimes feasible and better to use the smaller tank for tempering water and the larger one for wash water. This permits the use of more water for washing out than may be the capacity of the smaller tank.

If all the wash water is dumped after each load it is not essential that the amount used be accurately measured. In this case the driver can use all, or part of, the water in his wash-water tank (between 20 and 25 gallons is usually sufficient for a 4-cubic yard mixer), since it is dumped before the mixer is charged again. The amount used is replaced in the tank by the driver while he is getting his next batch. When this method is used, it is advisable to have a large mirror installed over the path of the trucks as they enter the bin, with an electric light arranged so that it illuminates the interior of the drum, so the weighman can inspect for water without leaving his post. It is surprising how such a mirror improves the memory of the driver who forgets to come under with his drum dry.

If the wash water is left in the drum, it is very important that it be measured accurately as this becomes part of the mixing water in the subsequent batch. Also to avoid confusion all the drivers should use the same amount of wash water. If the tanks on all the mixers are equipped with accurate water gages, each driver can be instructed always to use the same amount, say 20 gallons. As it is desirable to reduce the human elements as much as possible a more satisfactory arrangement is to have the same size wash-water tank on each mixer and use the entire capacity of the tank for each wash-out. Even this does not completely eliminate the personal element as the driver must be depended upon to completely fill the wash-water tank again after each load.

Probably the most satisfactory arrangement and one which places all the responsibility on one man, the weighman, is to place all the ingredients, including the added mixing water, directly into the drum and at the same time place a fixed amount of water in the wash-out tank on the mixer. This can be measured either by weight or by volume but should be automatic and entirely separate from the mixing-water measuring device. None of this water should ever be used for tempering. If tempering water is required it should be taken from the tank used for that purpose. After each batch has been disposed of the entire contents of the wash-water tank are run into the drum which is then revolved at agitating speed during the return trip to wash it out. Thus, for every load after the first the weighman deducts the fixed amount of wash water in measuring the batch since every truck returns with this amount in the drum. As with the first batch the wash water is again automatically measured and placed in the wash-out tank.

A frequent cause of trouble in transit-mixed concrete is leakage of water around the edge of the discharge gates. This condition, which is more common with the older types of mixers than with the newer types, especially high-dump models, is caused by either careless closing or warped discharge doors. This leakage if slight, can often be reduced to a negligible amount by simply directing the water toward the front end of the drum when it is introduced into the mix.



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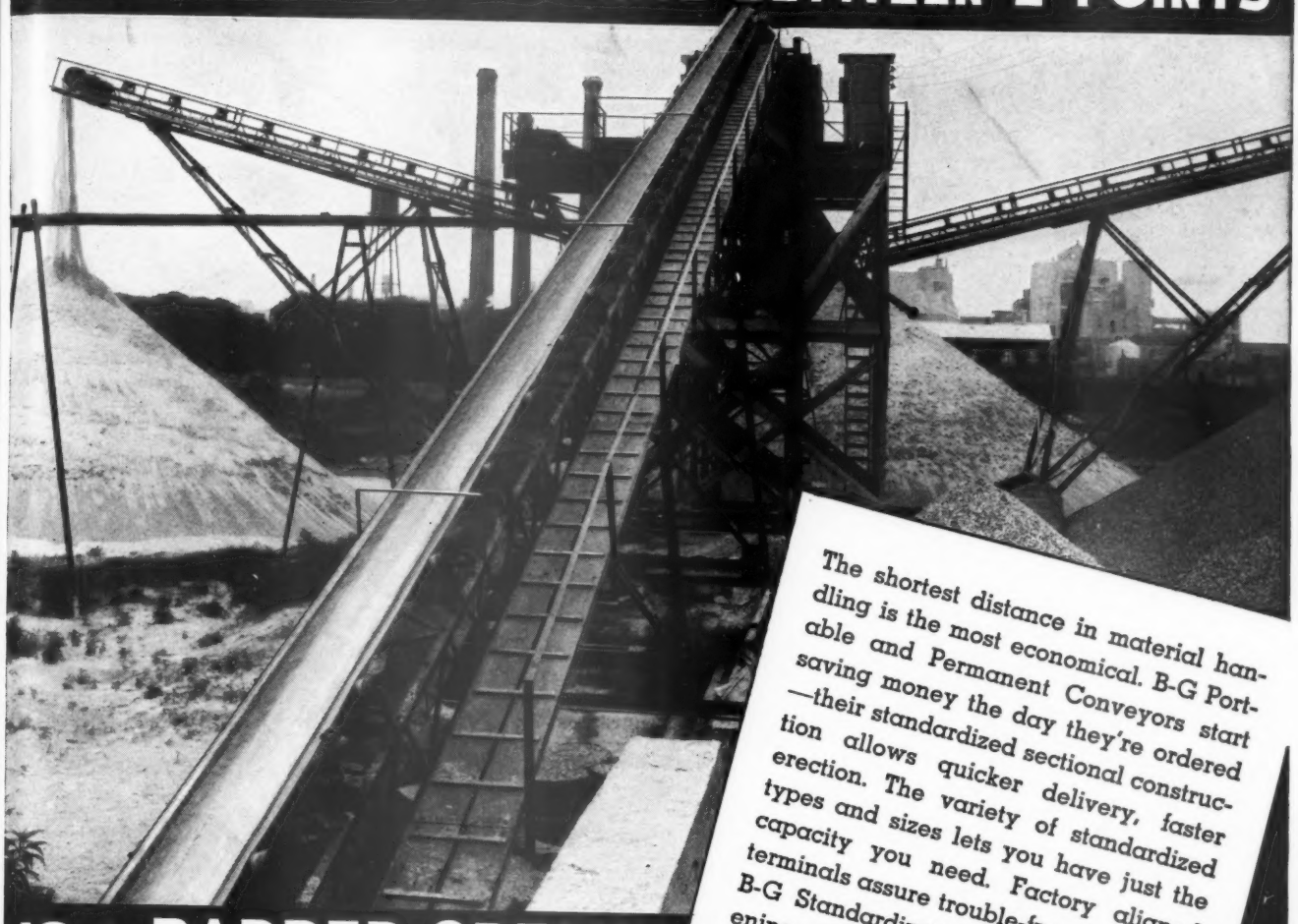

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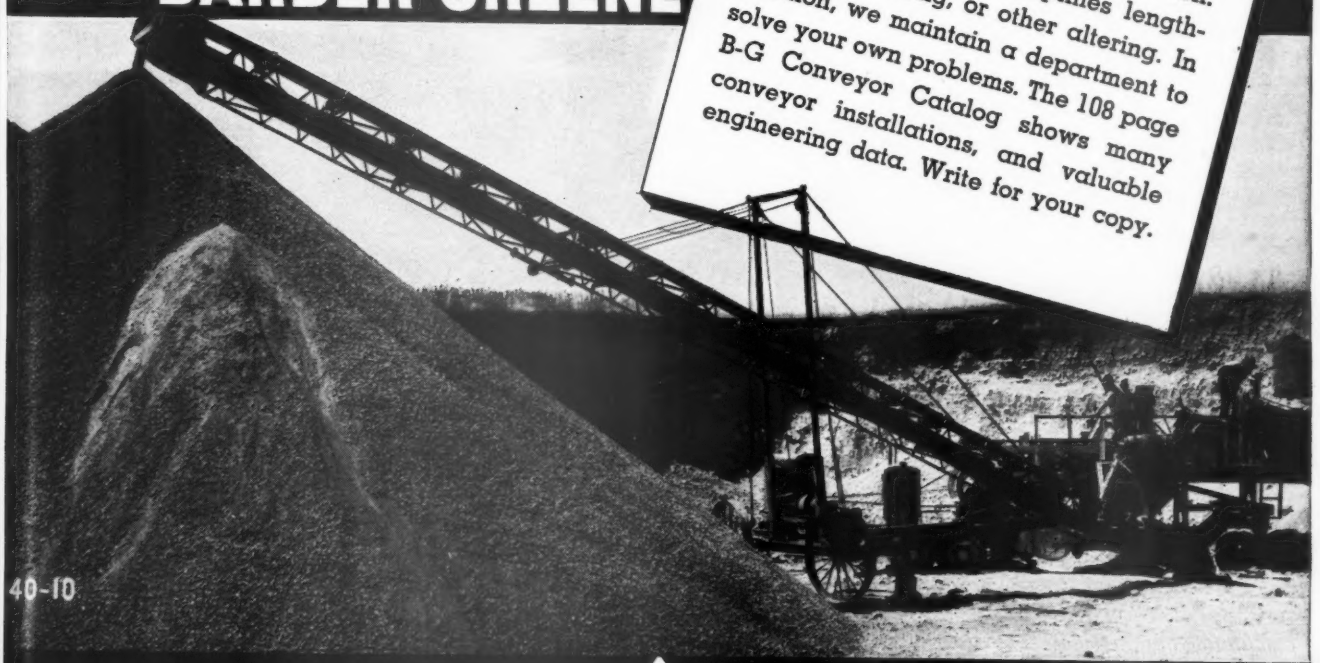

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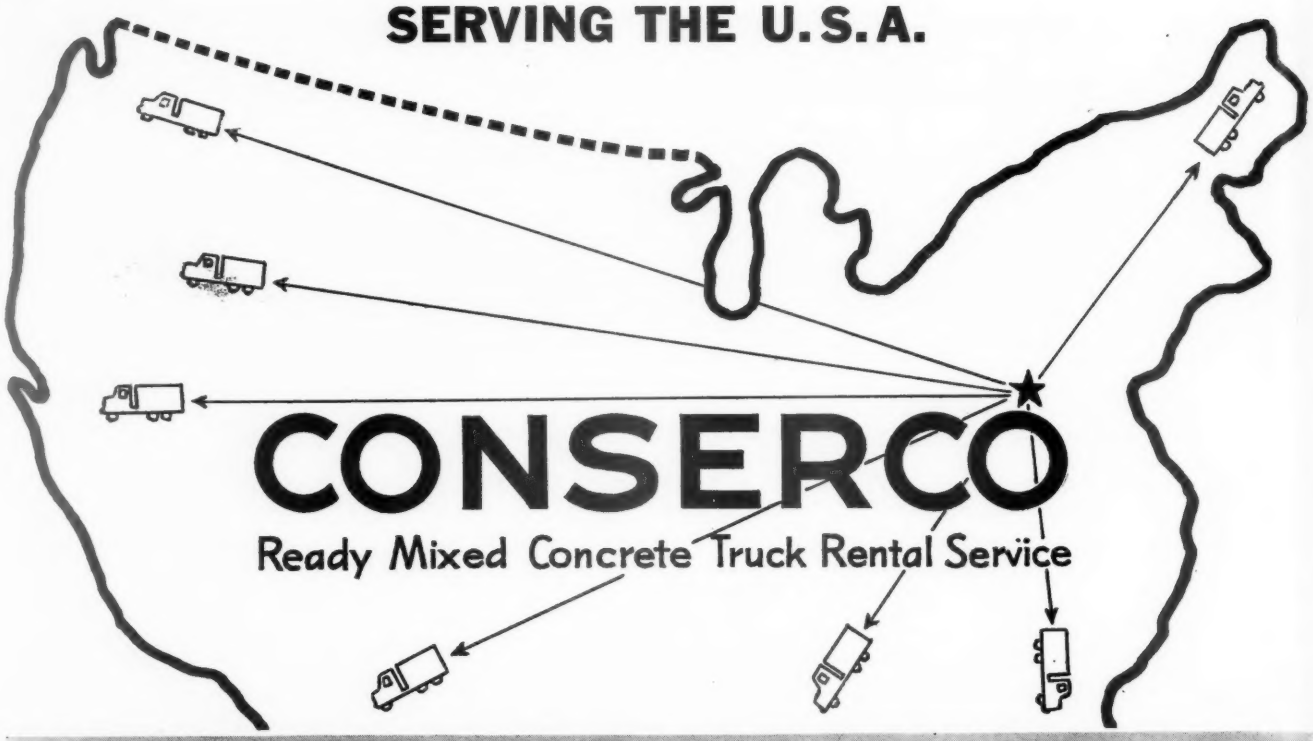

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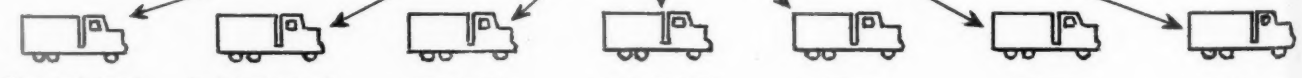

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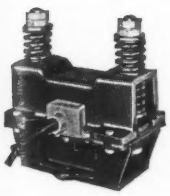

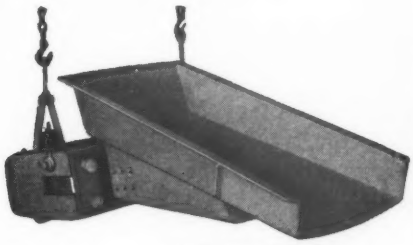

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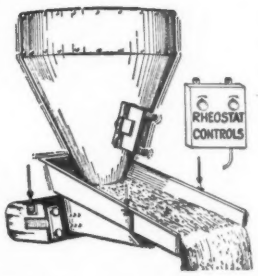

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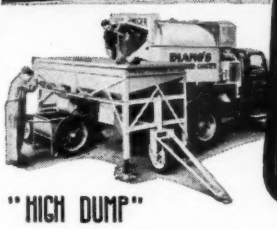

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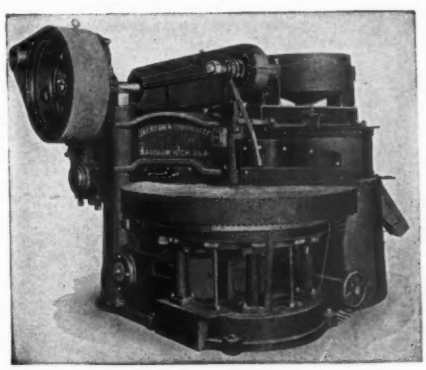

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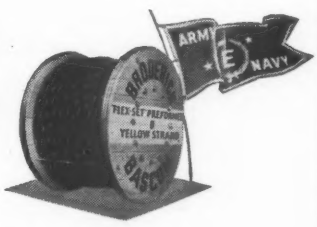

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DIAMOND Belt Conveyors

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Roll Crusher, DIAMOND 40 x 22
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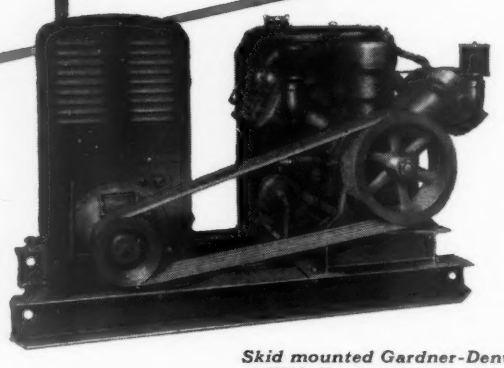

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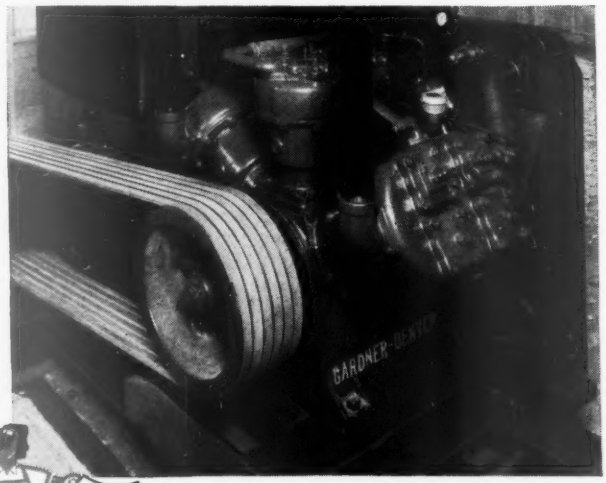

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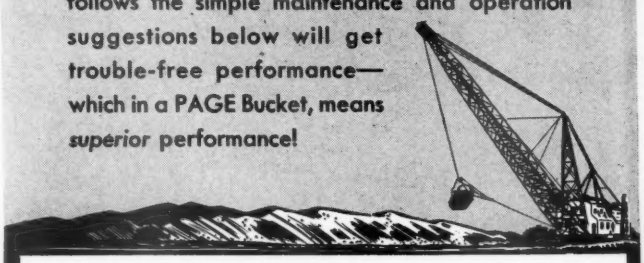
Get the MOST Out of Your Present Equipment!

Your PAGE Bucket can stand the gaff day after day without asking favors . . . but to keep your Dragline *machine* operating at top efficiency, take care of your bucket! Any operator who follows the simple maintenance and operation suggestions below will get trouble-free performance—which in a PAGE Bucket, means *superior* performance!



GOOD MAINTENANCE IS ESSENTIAL TO PRODUCTION

1. **CHAINS.** Chain life is shortened by uneven wear. Turn them over periodically.
2. **TEETH.** Sharp teeth are vital to fast digging. Renew points frequently.
3. **"PICK-UP."** Dragging the bucket after loading wastes time and causes excessive wear.
4. **CONTROL.** Help your operator prevent damage to bucket from uncontrolled dropping and jerking by keeping machine in adjustment.

Boost Production...
Keep America Strong

PAGE *Automatic* **DRAGLINE BUCKETS**

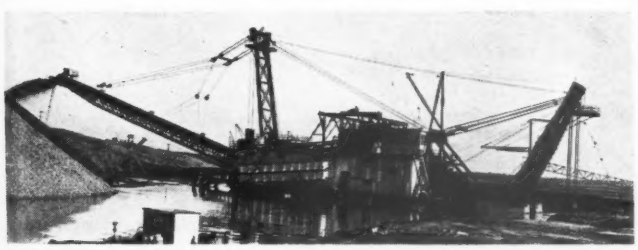
PAGE ENGINEERING COMPANY • CHICAGO, ILLINOIS

It takes wire rope to lift "block-busters" into bomb-bays

And that's just one of the unnumbered uses of wire rope on the fighting fronts. As many and more on the home front, industrial front, shipping front. Every length of wire rope now in service must last longer than ever before. So take care . . . extra care . . . unceasing care of your wire rope. Use facilities and services of regular source of supply in helping care for your wire rope . . . get maximum ton-miles of service for seeing you through to victory.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
WIRE ROPE DIVISION
PITTSBURGH AND MUNCY, PA.



This Is a Gold Dredge

Its dredging buckets dig deep into the ground beneath the stream, bringing up gold-bearing sand and gravel. Inside the dredge is a complete gold recovery plant. After the gold is extracted, the tailings, or waste materials, are carried up the "stacker" to be deposited on the ground. The stacker of this Yuba Gold Dredge, as in all Yuba dredges, is equipped with a—

Lightning Ribbed Conveyor Belt

—the belt which carries wet sand, gravel, and boulders up a steep incline (often more than 200 feet). No matter what the load, no matter how much water, no matter what the incline, the load does not slip. There's a lesson for rock, gravel, and sand men in these gold dredges!

The
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Factory and General Offices:
Manufacturing Co.
Park Ave. and Watts Sts. Oakland, California

SHEPPARD "Packaged Power" changed this "worn-out" shovel into a useful piece of equipment . . .

MANY pieces of machinery have been reclaimed with Sheppard Diesel "Packaged Power" to do their part during the national emergency. The compact, continuous duty All-American Diesel furnishes dependable, trouble-free, fuel-thrifty power. Adaptable to many kinds of equipment for many jobs, it will drive shovels, tractors, hoists, mixers and pavers, air compressors, conveyors, crushers, graders, rollers, screens . . . all types of quarry, construction and excavating equipment.

The Sheppard Diesel will reclaim and run old equipment or operate new equipment *more economically than any other type of power.* It requires no expensive installation . . . cuts your power costs! Write today for specifications and data on Sheppard "Packaged Power."

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Qualified dealers wanted . . .
write for complete information.

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Sheppard
ALL AMERICAN
Diesels

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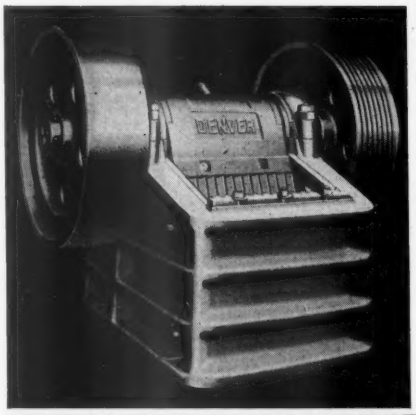
SCREENS are operating 24 hours daily in many of the 1000 aggregate plants using them today. To assist in keeping these units operating with a minimum of lost time, the Simplicity Engineering Company has arranged with the C. A. P. for *Courier Service,* so that urgently needed parts can be quickly flown to their destination. Another example of providing the fastest service available.

Simplicity Engineering Co.
DURAND . . . . . MICHIGAN



DENVER JAW CRUSHERS

The Denver Forced Feed Jaw Crusher is simple and has but few wearing parts. It is well adapted to coarse and fine crushing due to the forced feed principle. Rugged construction is used throughout including ribbed reinforced frame, chrome-steel eccentric shaft, roller bearings and heavy reinforced steel jaw bumper. Jaws are of manganese steel and are reversible. Bulletin No. C12-B describes bronze bearing crushers and Bulletin No. C12-B1 anti-friction bearing crushers.

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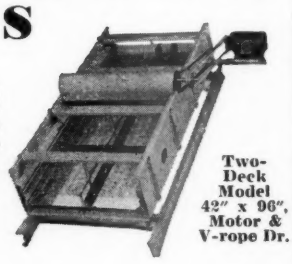
Tried, Proved and Guaranteed Vibrating Screens. Since 1919, the BEST in screening equipment at the LOWEST COST.



Two-Deck Model 42" x 96", Motor & V-rope Dr.

NEW! 32-page Catalog on Screens and Screening. Just ask for Catalog No. 107.

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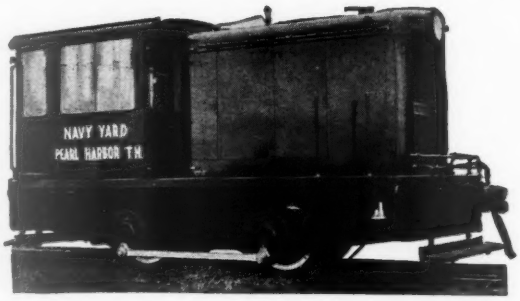

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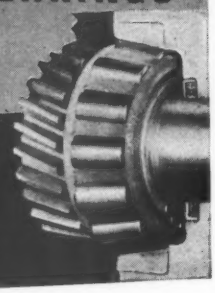

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No Wisconsin Engine, so far as we know, has ever had a case of "Bearing Failure." Basically, this is an end result of using Timken Roller Bearings at both ends of the crankshaft. Normally, small engines are not provided with this safeguard . . . but every Wisconsin Engine, whether single cylinder or 4 Cyl.; 1 hp. or 35 hp., has this heavy-duty service protection. This is a typical example of Wisconsin Air-Cooled Heavy-Duty Engine design and construction . . . geared to maximum utilization of power-operated equipment.

MOST POWER Per POUND

WISCONSIN MOTOR Corporation
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Keep war production moving without delay by relying on AMERICAN Crushers, known throughout the industry for their ruggedness, low power consumption, sterling dependability. Deliver 10 to 100 tons per hour with no "time-outs." Uniform and cubical product assured.

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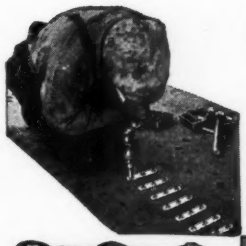
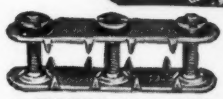
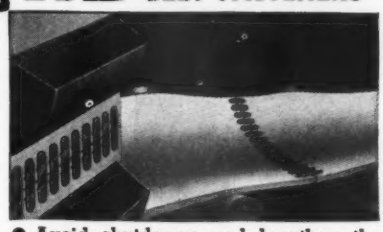


Keep your conveyor belts going with FLEXCO HD BELT FASTENERS



• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.



• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy

FLEXIBLE STEEL LACING COMPANY
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FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

8 Ways to Prolong Screen Life!

1. Lubricate bearings.
2. Check alignment of drive.
3. See that feed is evenly distributed.
4. Keep screen frame well painted.
5. Keep screen cloth clean when not in use.
6. Maintain tension of screen cloth.
7. Check clearances between moving and stationary parts.
8. Follow instructions of manufacturer

9177

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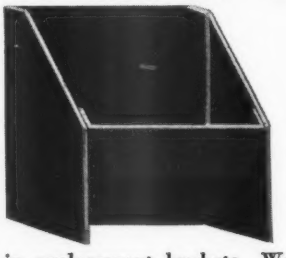

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Standard designs or special buckets to your order. Skilled service in a well-equipped plant specializing in replacement buckets. Welded or riveted construction. Sizes up to 42" long ¼" steel. Large or small orders given prompt and individual attention. Write for prices.

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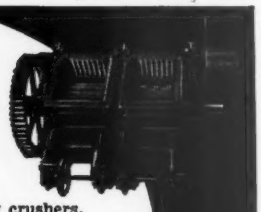

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SAND—GRAVEL

Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

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The most profitable investment in conveyor equipment! A pulley that saves at least 50% in conveyor belts! This exclusive Sprout-Waldron development prevents material from coming between the face of the pulley and the belt . . . eliminates the heavy friction wear and punching of holes. Interchangeable with standard pulleys. *Write for list of sizes available.*

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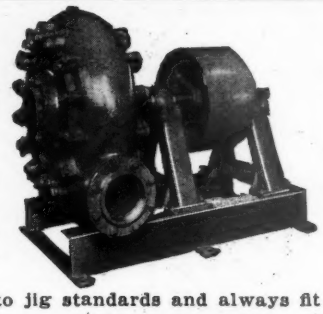
ELEVATORS, CONVEYORS, POWER TRANSMISSION EQUIPMENT

The Lightning Sand and Gravel Pumps

HEAVY-DUTY
(Ball-Bearing)
and Low Head Types

Complete stock of replacement parts, elbows and fittings carried for prompt shipment.



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For 30 years LIGHTNING pumps have faithfully performed the work they are intended for. We manufacture a type and size to fit the need. Simplicity of design and ease of handling have made these pumps one of the most popular. Write for catalog now.

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THE EXECUTIVE WHO STOPS TO THINK . . .

Knows that "10% for War Bonds isn't enough these days"

Workers' Living Costs going up . . . and Income and Victory Tax now deducted at source for thousands of workers . . .

Check! You're perfectly right . . . but all these burdens are more than balanced by *much higher* FAMILY INCOMES *for most of your workers!*

Millions of new workers have entered the picture. Millions of women who never worked before. Millions of others who never began to earn what they are getting today!

A 10% Pay-Roll Allotment for War Bonds from the wages of the family bread-winner is one thing—*a 10% Pay-Roll Allotment from each of several workers in the same family is quite another matter!* Why, in many such cases, it could well be jacked up to 30%—50% or even more of the family's *new* money!

That's why the Treasury Department now urges you to revise your War Bond *thinking*—and your War Bond *selling*—on the basis of *family* incomes. The current War Bond campaign is built around the family unit—and labor-management sales programs should be revised accordingly.

For details get in touch with your local War Savings Staff which will supply you with all necessary material for the proper presentation of the new plan.

Last year's bonds got us started—*this year's bonds are to win!* So let's all raise our sights, and get going. If we all pull together, we'll put it over with a bang!

This space is a contribution to America's all-out war effort by

PIT AND QUARRY

you've done your bit
. . . now do your best!

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Even beyond the border go E. C. A. cranes, hoists, etc. to do their part in the war. Now they serve on the Alcan Highway.

SPECIAL

1—Austin Machinery Corporation gasoline powered crawler crane, No. T 10054, complete with shovel front and 31′ crane boom. Powered by 4 cylinder Climax gasoline engine. Crane ¾ yd. capacity, fully revolving, mounted on caterpillars.

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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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1—18″x45′ Link Belt stationary conveyor, troughing belt type, elect. or gas power.
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1—No. 4 Champion jaw crusher, size 9x15″, Ser. No. 2606.
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1—Acme jaw crusher, Ser. No. 1873, size 12x20″.
1—Acme jaw crusher, Ser. No. 1686, size 9x16″.
1—United Iron Works, "Blake-type" jaw crusher, size 9½x24″.
1—Allis Chalmers, No. 5 gyratory crusher, Ser. No. 5331, opening 10x38″.
1—Austin No. 5 gyratory crusher, Ser. No. 2945, opening 12x35½″.

DERRICKS

3—Steel Guy Derricks; 1—20-ton American-Terry 90′ mast, 110′ boom; 1—5-ton Terry Guy derrick, 70′ mast, 60′ boom; 1—5-ton Insley, 75′ mast, 80′ boom; Stiff leg derricks; 1—12 ton derrick, 75′ boom for hook work; 1—2-ton Pittsburgh, 26′ boom, 15′ mast. Also a number of wood stiff leg derricks, 1 to 5 ton cap.

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55—Electric ranging from 20 HP up to 125 HP, consisting of triple-drum, double-drum and single-drum, with AC or DC motors, some with attached swingers. Following makes: American, Clyde, Lambert, Lidgerwood and National.
Gas hoists ranging from 8 to 120 HP, single, double and triple-drums; all standard makes. (38 in stock.)
Steam, ranging from 8 HP to 60 HP, single, double and triple-drums; all standard makes.

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1—7 ton Plymouth type 2, Model D L 24″ gauge locomotives power gasoline engine.
3—7 ton Whitcomb type MO 24″ gauge, power gasoline engines.
1—7 ton Plymouth 24″ gauge type 2 Model HL power gasoline engine.
1—3½ ton Plymouth 24″ gauge Model A L 105 gasoline power.
1—3 ton Whitcomb 24″ gauge type U T gasoline power engine.

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1—10″ Morris sand pump, Ser. No. 86864, cap. 87 cu. yds. per hr.
1—8″ Cataract dredging pump, Ser. No. 175895, cap. 2000 GPM @ 53′ head.
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1 Ingersoll-Rand 9 x 8 Air Compressor.
1 7½ D Gates Gyratory Crusher 42″ x 20″.
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1 Westinghouse 200 H.P. slip ring induction motor.
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1 Broughton Mixer.
1 Hair Picker.
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General Electric 50 H.P. Induction Motor.
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1 General Electric Co. 50 k.w. D/C Generator—type CL-90 — form B — 200 amps. 250 volts — 1080 R/P/M—complete with rheostat—sliding BASE—paper pulley.

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We are also manufacturers of Carry-all trailers, 10 to 40 Ton Cap'y.

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1—Ruggles Cole Class A-4, 4½′x26′ Rotary Dryer, with furnace, piping and fan
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10—Jaw Crushers, 7″x10″ to 24″x36″
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500′ Screw Conveyor, up to 12″
2000′ Belt Conveyor, 12″ to 24″

PARTIAL LIST ONLY. SEND FOR BULLETIN.

BRILL Equipment Co.
183 VARICK STREET NEW YORK

FOR IMMEDIATE SALE

1—15x24 Cedar Rapids Roller Bearing Crusher. New in June 1941. Complete with 35 H. P. Electric Motor and all necessary drives. Rebuilt and fully guaranteed.
1—24x36 Jaw Crusher, plain bearing
1—8x37 Traylor Gyratory Crusher Model H-5.
1—8x36 Universal Jaw Crusher.
1—6x8 Universal Jaw Crusher Model 1-B.
1—Portable Pioneer Dry Screen Plant Model No. 12.
1—Semi-Portable Cedar Rapids Washing Plant, including: Plate Feeder, Symons Screen, 9x36 PB Jaw Crusher, Bucket Elevator, Delivery Conveyor, Washing Screen, Wood Bin Structures.
1—3x10 Symons DD Vibrating Screen.
1—3x10 Allis Chalmers 3 Deck Vibrating Screen.
1—⅜ Yard Universal - Fordson, ¾ Swing Crawler Shovel.
1—32 Ft. Crane Boom, Channel Type.
1—No. 2 Northwest Shovel Front.
1—¾ Yard Shovel Bucket with teeth.
1—65 H.P. Clyde Gas Hoist.
1—1 Yard Sauerman D.D. Drag Scraper, 50 H.P. Motor.
1—42-A Barber Greene Bucket Loader.
1—P&H Trencher, Model 15-36.
1—10 ton, 3 wheel Galion Roller.
1—1½-2 ton Pierce Tandem Roller.
1—30 Ft. Type "C" Lakewood Concrete Finishing Machine.

All items subject to inspection, prior sale or other disposition.

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20 ton Link Belt locomotive crane, MCB, double drums, 50′ boom, ASME boiler, completely overhauled, low price.

Barber-Greene Model 42 crawler gas operated, disc type, bucket loader with electric starter, just overhauled, first class condition.

2—150 HP each Stanwood locomotive type boilers.

10 ton Buffalo-Springfield 3 wheel gas roller.

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MOST ALL SECTIONS IN STOCK also spikes, bolts, frogs, and switches available.
500 BRICK DRYER CARS
Always in the Market to buy surplus material. Send us your inventories.

M. K. FRANK
480 Lexington Ave. New York City
25 St. Nicholas Bldg. Pittsburgh, Penna.

FOR SALE

One Novo 3 cylinder water cooled Gas Engine, direct connected to Novo built high pressure pump. Used for road building water line.

HENRY FLIGELTAUB COMPANY
Division & New York Ave., Evansville, Ind.

LIQUIDATION *Buy Now!*

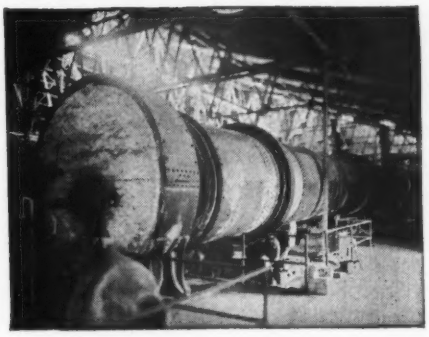
EQUIPMENT FORMERLY OWNED BY

VULCANITE *Portland Cement Co.*

ALPHA, N. J.

3 miles from Phillipsburg, N. J. and Easton, Pa.

• KILNS



Vulcan Iron Works Steel Rotary Kilns

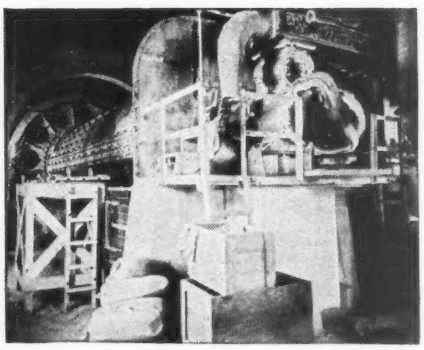
3—Vulcan Iron Works steel rotary kilns, 8'6"x7'6" dia., 125' long, fire brick lined.
1—Vulcan Iron Works steel rotary kiln, 7'6"x7' dia., 125' long, fire brick lined.
6—W. F. Mosser & Son steel rotary kilns, 5'6"x5' dia., 60' long, fire brick lined.

NEW SPARE PARTS FOR ALL ITEMS

Air Compressors

1—Ingersoll-Rand 18¼"x14"x18" horizontal duplex air compressor, belted motor drive, with 3'6"x20' riveted steel air receiver.
1—Ingersoll-Rand Duplex Air Compressor, 11"x16"x18" belted motor drive.

• MILLS



Allis Chalmers 7 x 30 Tube Mill

1—Allis-Chalmers Dry Grinding Compeb Mill. No. 8745. This is a four compartment mill with the first compartment 10' long and 8' in diameter with taper the rest of the 45' length of the mill 7' in diameter. The mill has chilled iron liners, and 36" table feeder, 72" Cutler Hammer Magnetic Clutch, and 3 compartment Dust Collectors.
1—Williams mill, size 3.
5—No. 8 Krupp steel ball mills, spur geared, with counter shaft.
14—30" Griffen Mills.
26—42" Fuller Lehigh pulverizers, each with belt idler.
3—33" Fuller Lehigh pulverizers, each with belt idler.
1—5'6" diameter x 22' long F. L. Smidth & Co. Tube Mill with chilled iron lining and steel heads and trunnions. Trunnion discharge.

NEW SPARE PARTS FOR ALL ITEMS

Steel Balls

120 tons steel balls, ¾" to 5".

Hoists

1—Double Drum Steam Hoist, S. Flory Mfg. Co. 11"x14" Duplex.
1—Westinghouse 60" single drum hoist.

Steel Buildings

24 Steel buildings suitable for re-erection.

Boiler Plant

2—800 H.P. Edgemoor Boilers, 200 lb. pres.
3—800 H.P. Babcock & Wilcox waste heat boilers, 200 lb. pres.
2—400 H.P. Babcock & Wilcox W. T. Boilers, 200 lb. pres.
All complete with blowers, feed pumps, feed water heaters, etc.

• CRUSHERS

1—Allis Chalmers Fairmont Roll Crusher, 36"x60".
2—No. 6 Gates gyratory rock crusher.
1—No. 6 McCully gyratory rock crusher, style K.
5—No. 5 Gates gyratory crushers.
1—Mosser rotary clinker crusher.
1—No. 10 McCully gyratory rock crusher with extra gear, eccentric and bell.

NEW SPARE PARTS FOR ALL ITEMS

Dust Collecting Systems

2—W. W. Sly Dust Collecting Systems, each with exhaust fan, 10 H.P. motor and cyclone dust collectors.

STEEL BINS

Steel Plate Storage Bins that can be reassembled—Order at once. 58 Bins in Various Capacities & Sizes.

Cu. ft.	Dimensions
35,184	18'x4" x 70' x 27'5" high
19,592	11'3" x 40'6" x 43' high
10,440	12' x 58' x 15' high
9,270	12' x 51'6" x 15' high
7,460	10' x 55'3" x 13'6" high
6,827	12'8" x 44' x 12'3" high

Also various BINS as follows

4—1,650 cu. ft. and under
1—1,116 cu. ft. and under
5— 896 cu. ft. and under
6— 640 cu. ft. and under
7— 532 cu. ft. and under
12— 370 cu. ft. and under
11— 288 cu. ft. and under
2— 95 cu. ft. and under
1— 37 cu. ft.

CONVEYORS

RUBBER BELT

14"—16"—18"—20"—24" and 28" Centers varying from 30' to 203' Some with movable Trippers.

STEEL SCREW

6"—7½"—8"—10"—12"—14"—16"—18" and 20" In Steel Box Over 10,000 ft. all lengths.

BUCKET ELEVATORS

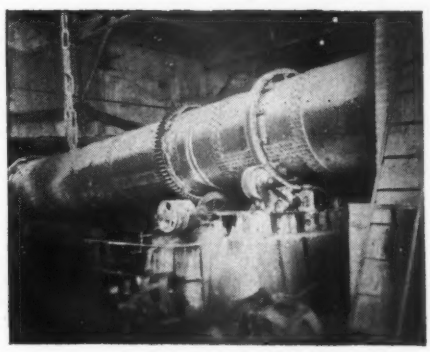
Thousands of feet of bucket elevators, all sizes of buckets, mostly all steel encased.

BUCKET SIZES: 10 x 18—10 x 15—9 x 14—9 x 13—9 x 12—8 x 16—8 x 15—8 x 14—8 x 13—8 x 12—7 x 12—7 x 11—7 x 10—6 x 10—6 x 9—6 x 7

With—844; 103; 132 chain from 12' to 60' heights.

NEW BUCKETS and GEARS

• DRYERS



W. F. Mosser & Son Steel Rotary Dryers with Steel Stacks

2—W. F. Mosser & Son steel rotary dryers, with 65" steel stack.
2—W. F. Mosser & Son steel rotary dryers, 72"x60" dia., 60' long, bevel gear drive, each with counter shaft and 40' steel stack.
1—W. F. Mosser & Son steel rotary dryer, 72"x60" dia., 55' long, bevel gear drive, with counter shaft and 35' steel stack.
1—W. F. Mosser & Son steel rotary dryer, 72"x60" dia., 55' long, bevel gear drive, with counter shaft and 50' steel stack.
1—Ruggles 5'x30' Rotary Dryer.

NEW SPARE PARTS FOR ALL ITEMS

Engine Sets

6—Engine Generator Sets. 800 KW, 750 KW, 575 KW, 475 KW and two 400 KW D.C. sets.

Miscellaneous

4—Buffalo forge blowers and exhausters.
Complete Stock Room supplies, New Gears, Bearings, Belting, Safety Switches, Pumps, Shafting, and Pulleys, etc.
Thousands feet of conduit.

Write direct to Plant office, P. O. Box 188, Easton, Pa.

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HEAT and POWER Company, Inc.

45 BOND STREET Phone: ALgonquin 4-3874 12, NEW YORK, N. Y.

—STACKER—

FOR HIGH STOCK PILING OR SPOIL

165′ boom—5 ton aluminum car (counter balanced).
250 HP Hoist Motor.
All electric with cab control. Caterpillar mounted with individual travel and steer motors.
Ideal for disposing of material from short-boom shovel.

Address inquiries to—

HUNTSVILLE-SINCLAIR MINING CO.
114 W. 11th St. **Kansas City 6, Missouri**

SHOVELS—CRANES

Lima Model 101 comb. Shovel-Crane. Excellent.
P & H Model 600 Shovel, 1 yard capacity
Bucyrus Erie Model 50B, 2 yd. comb. Shovel-Crane
Bucyrus Erie Model 1030 Electric Tunnel Shovel
Moore Speedcrane 15 tons, gas
Osgood heavy duty gas Shovel, 1 yard
Marion Model 460 Electric Shovel, 1½ yard
Marion Model 32, 1½ yard Steam Shovel
Byers ½ revolving Crane, Shovel & Backhoe.
Ind. Brownhoist 10 ton cap. Crane, gas, 40′ bm.
Brownhoist 5-7½ ton Gas Crane, 30′ boom
Koehring Shovel Front, ¾ yard
Osgood Shovel Front, 1 yard

SPECIALS!!

Complete Ready-Mix Concrete Plant
2—Steel Stiff-leg Derricks, 10 tons, 100′ bm.
Allis-Chalmers cent. pump, electric, 3500 GPM. 50′
Worthington 8″ cent. bronze impeller, elec. Pump
Butler 16 cu. ft. Asphalt Pug Mill

BUCKETS—STONE SKIPS

2 yd. Hayward Clamshell, rehandling
1½ yd. Williams Clamshell, rehandling
⅝ yd. Williams Clamshell, digging
2—½ yard Haiss Clamshell, rehandling
¾ yd. Haiss Clamshell, rehandling
Erie ¾ yd. Clamshell, rehandling

TRACTORS—BULLDOZERS

TD 40 Diesel Tractor with bulldozer
TD 35 Diesel Tractor with bulldozer
2—RD6 Tractors with bulldozers
Allis Chalmers K Tractor with Baker bulldozer
Allis Chalmers L Tractor with Baker bulldozer
Cletrac Model FG Tractor with Garwood bulldozer

COMPRESSORS

I.R. belted 900 cu. ft., 600 cu. ft., 528 cu. ft. Portable 310 cu.; Sullivan 1214 cu. ft., 1050 cu. ft. Diesel, 455 cu. ft.; Worthington 800 cu. ft.; I.R. 315 cu. ft., 2 stage, gas, Portable

CRUSHERS—CRUSHER PLANTS

Gyratory Crushers: K.V.S. 30, 37-S, 49; Traylor 8″; McCully 13″, 8″, 6″
Jaw: 10x22, 10x24, 11x18, 12x24″, 14x24″, 16x32, 15x36″, 24x36″, 56x84″
Complete Rock Crushing Sand & Gravel Plants

LOCOMOTIVES—CARS

American 60 ton, steam, std. ga.
American 50 ton, steam, Saddle Tank
American 40 ton, steam, Saddle Tank
Vulcan 16 ton, 36″ gauge, gas
Porter 13 ton, Steam Saddle Tank, 36″ gauge
Milwaukee 9 ton, std. gauge, gas
Vulcan 8 ton, std. gauge, gas
Vulcan 6 ton, 36″ gauge, gas
20—Phoenix 5 yd. heavy duty, 36″ ga. Quarry Dump Cars
21—Koppel 4 yd., 36″ gauge Dump Cars
3—30 ton Standard Gauge Flat Cars, rebuilt

RICHARD P. WALSH COMPANY
30 Church St. **New York, N. Y.**

AIR COMPRESSORS

14x12″ Chicago Pneumatic, 100 hp slip ring motor
360′ Schramm 4 cyl. 60 hp motor, V belt drive
Ing.-Rand portable 275′ with 50 hp Waukesha
Ing.-Rand 6x6 vertical air compressor

BUCKET ELEVATORS

46′ elevator with 18″ continuous steel buckets
50′ elevator with 16″ steel buckets on chain
50′ elevator with 20″ malleable buckets
25′ elevator with 6″ malleable buckets on chain
35′ continuous elevator with 30″ steel buckets
Several elevators with 4″ to 5″ Salem buckets
1500-6 ply used 20″ elevator belt
Gears, sprockets, elevator and driving chain
Malleable, continuous and Salem buckets, 4″ to 30″

CRUSHERS, ROLLS and MILLS

11″ x 20″ New England jaw crusher
8″ x 14″ Climax jaw crusher
11″ Traylor "Bulldog" gyratory crusher
Williams No. 2 "Regular" type hammermill
Williams No. 2 "Semi Vulcanite" hammermill
Sturtevant No. 0 Rotary Fine crusher
A-C 24x38 single roll heavy duty coal crusher
Simplex Unit Coal Pulverizer, type 33A
Robins 28″x30″ double roll coal crusher
Single roll crusher 24″ x 24″ with knobs
36″ x 30″ American Standard double roll crusher
18″ and 24″ x 30″ American Standard Disintegrator

MISCELLANEOUS

10-ton Davenport standard gauge locomotive
8-ton Whitcomb, 36″ gauge, gasoline locomotive
30″ gauge Mercury Battery Mine Locomotive
3 electric car pullers
20″ and 24″ gauge small flat cars
Generators for Hummer screens, belt or motor driven
Centrifugal pumps, motor, bins and tanks
Revolving dryer, 4′x21′ with 18″ flue

CONVEYORS

200′—30″ trough belt conveyor
65—42″ and 120—36″ trough and flat idlers
4—100′ 14″ belt conveyors
Trough idlers and pulleys for 14″-36″ conveyor
Cast and Steel driving pulleys
L-B 15″ x 5″ single strand flight conveyor
360′ 42″ wide 7 ply rubber covered belt
1000′ of 30″ 6 ply conveyor belt

SCREENS, SAND TANKS

Revolving screens, 3x8′, 4x16′, 5x20′
Hummer vibrating screens, single—double deck
2 Jigger double deck 2′x5′ vibrating screens
Plat-O 4x6 double deck vibrating screen

G. A. UNVERZAGT & SONS
136 Colt St. **Irvington, N. Y.**

FOR SALE

Brownhoist Locomotive Crane, 15 ton, 8 wheel, std. gauge
Wire Rope, Cable and Guying
17 Hoisters, single and double drum, various sizes
2 Lidgerwood Swingers—4 Dobbie Derrick Winches
Air Compressors, Stationary and Portable
Jackhammers, Air Grinder, Wood Borer
Derrick Castings—Sheaves
Tackle Blocks
Heavy Chain ¾″ and ⅞″
2—I. R. Drill Sharpeners Series 40 and 50
Electric Motors 2 to 50 H. P., Induction and Slip-ring
Pumps—Centrifugal and Triplex
Black Pipe, 2″, 2½″ and 3″
Universal Steam Semi-Automatic Dipper Trip Type D
Light and 80 lb. Railroad Rail—Small Cars
2 yd. Steel Dump Body with hoist
Steel and Wood Split Pulleys—Shafting
Linn Tractor Model 628-D, Capacity 10 ton
Quantity Linn Tractor Parts
11 Koppel 4 yd. Side Dump Cars 36″ Gauge. Also 1 Spreader Car
Austin No. 4 Gyratory Crusher
Portable Climax Jaw Crusher
1—Symons Disc Crusher 24″
3—Mosser Crushing Rolls 30″
1—4 H. P. and 2—6 H. P. Gas Engines
1¼″ Round Hollow Drill Steel 2 to 4′ lengths
Valves Miscellaneous Sizes

S. Weinberg Company
Granville, N. Y.

FOR SALE

CRUSHING PLANT

Practically new Telsmith Crushing Plant, consisting of 13B Gyratory Primary Breaker, 36″ Gyrasphere Reduction Crusher, 61 ft. No. 7 belt elevator, two 4′ x 12′ triple deck Pulsator Screens, Murphy ME-650 200 H.P. Diesel, 2 International U-2 Gasoline Power Units, conveyors, transmission and drive complete, 5 bin gates. All new in 1942.

POWER UNITS

2 Rebuilt International PD-40 4 cylinder Diesel Power Units complete, 62½ Horse Power.
1 Rebuilt International Model 300 Gasoline Power Unit complete, 56.5 Horse Power.
2 New International Model U-21 Gasoline Power Units, 66½ Horse Power.

SHOVEL BOOM

1 New Shovel Boom, bare, for Bucyrus-Erie 20-B ¾ Yard Machine.

ELEVATOR

1 New Telsmith No. 5 Chain Type Elevator complete with drive, 35 ft. centers, 15″ buckets.

WAGON DRILLS

2 Thoroughly rebuilt Ingersoll-Rand X-71—FM-2 Wagon Drills, pneumatic tire mounting, 1¼″ chuck.

BRANDEIS MACHINERY & SUPPLY CO., INC.
Brook & Warnock Sts. **Louisville, Ky.**
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FOR SALE

110 Trusses 48″ high, 12″ wide, 33 to 54 ft. long
4 Trusses 60″ high, 12″ wide, 34 ft. long
41 columns 12x12 and 14x14—25th, 38 ft. long
18 columns 8x8—16 ft. long cast iron
4 columns 6½ thick, 12 ft. long round

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Damaged & Rejected

Welding Rods

Write for Details

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CEDAR RAPIDS, IOWA

1913 • DEPENDABLE USED EQUIPMENT FOR 30 YEARS • 1943

2—**POWER UNITS**, New "Caterpillar" Model D13000, 6 cylinder Diesel, gasoline starting engine, radiator cooled, enclosed type clutch with stub shaft, fuel tank, hood and dash, 140 HP at 900 RPM, all on steel channel base. Price..**EACH $3595.00**

2—**POWER UNITS**, New "Caterpillar" Model D3400, 4 cylinder Diesel, 31 HP at 1400 RPM, gasoline starting engine, radiator cooled, enclosed type clutch with stub shaft, fuel tank, hood and dash, all on steel channel base. Price..**EACH $1427.50**

1—**POWER UNIT**, Rebuilt "Caterpillar" Model D4400, 4 cylinder Diesel, gasoline starting engine, radiator cooled, enclosed type clutch with stub shaft, fuel tank, hood and dash, all on steel channel base, 50 HP at 1400 RPM. Price **$1475.00**

1—**POWER UNIT**, Rebuilt Model D6100 "Caterpillar" Diesel, gasoline starting engine, radiator cooled, open type clutch with extended shaft and pillow blocks, all on steel channel base. Price **$1695.00**

1—**ENGINE**, New Buda Model 6DT351, 6 cylinder Diesel, radiator cooled, electric starter, 55 HP at 1800 RPM. Price.....**$1585.00** Clutch can be supplied at extra cost.

2—**ENGINES**, New Hercules Model WXC3 Gasoline, 6 cylinder, 77 HP at 1600 RPM, radiator cooled, with electric starter. Price.....**EACH $887.50** Clutch can be supplied at extra cost.

5—**ENGINES**, New Buda Model K393 Gasoline, 6 cylinder, radiator cooled, with electric starter, 72.5 HP at 1600 RPM. Price....**EACH $680.00** Clutch can be supplied at extra cost.

2—**ENGINES**, New Hercules Model QXC5 Gasoline, 6 cylinder, radiator cooled, electric starter, 50 HP at 1800 RPM. Price.....**EACH $425.00** Clutch can be supplied at extra cost.

1—**POWER UNIT**, Rebuilt Waukesha Model WOK45A Gasoline, 4 cylinder, 7½x8, 145 HP at 900 RPM, radiator cooled, enclosed type clutch with stub shaft, electric starter. Price.....**$2250.00**

1—**TRACTOR, SCRAPER, ANGLEDOZER AND RIPPER**, Model RD8 "Caterpillar" Diesel Tractor, Model LP LeTourneau 15 yd. Scraper, LeTourneau Model AK8 Angledozer, and LeTourneau Rooter Model H3, heavy duty type. Price....**$12,945.00**

2—**WAGON DRILLS**, Cleveland Model DR30, latest type, pneumatic tires. Price.....**EACH $1020.00**

1—**ROCK DRILL**, Cleveland Model H7, for hexagon steel, with 1" shank, latest type, A-1 condition, serial No. 3H2470. Price.....**$85.00**

2—**JACKHAMMERS**, Ingersoll-Rand Model S49, for 1" hexagon shank, good operating condition, serial No. 441134 and 35. Price.....**EACH $125.00**

4—**NEW BACKFILL TAMPERS**, Cleveland Model No. 5.....**PRICE ON APPLICATION** No Priority

7—**NEW ROCK DRILLS**, Cleveland Model H66 for ⅞" hexagon shank, latest type.....**PRICE ON APPLICATION** No Priority

4—**NEW ROCK DRILLS**, Cleveland Model H77, for 1" hexagon shank, latest type.....**PRICE ON APPLICATION** No Priority

1—**CABLEWAY**, Sauerman, Tautline Outfit, 5-ton capacity 630' span, complete with 900' of ⅝" hoist cable, 775' of ⅝" inhaul cable, 1450' of ⅝" outhaul cable, 920' of 1¾" track cable, with clamps, sheaves, etc., for setting up the outfit. Price **$900.00**

1—**LOCOMOTIVE**, Vulcan, steam, standard gauge, 33-ton, saddle tank type, 72" wheelbase, boiler 3'4"x15'0", 13"x18" cylinder. Price.....**$5950.00**

1—**100 KVA GENERATOR SET**, consisting of Rebuilt 100 KVA Generator, General Electric, 3 phase, 60 cycle, 240 volt, complete with belted exciter and rheostat, direct connected with flexible coupling to rebuilt Model WCK45A Waukesha 145 HP Gasoline Power Unit, complete with radiator, clutch, electric starter and batteries, all mounted on steel channel base. This is an A-1 set. Price **$4298.00**

23—**DRUMS EXTREME PRESSURE TRANSMISSION LUBRICANTS**, No. 733A SAE250 Mid-Continent Petroleum Diamond. We are closing out our stock of lubricants at a reduced price. List Price 9½c. Our price .....**5c lb.**

1—**60 KVA GENERATOR SET**, consisting of rebuilt 60 KVA Fairbanks-Morse Generator, 3 phase, 60 cycle, 230 volts, with belted exciter and rheostat, direct connected to rebuilt Model DHXB Hercules, 6-cylinder, 110 HP Diesel Engine, radiator cooled, with electric starter and batteries, all mounted on steel channel base. Price.....**$3654.00**

1—**AIR COMPRESSOR**, Stationary Type, Sullivan, Class WN-32, 868 C.F.M. displacement at 277 RPM, 730 C.F.M. actual air, size 17x10¼x14, including air filter, 3'6"x10' air receiver. Price **$2700.00**

1—**JAW CRUSHER**, Rogers 10"x24", plain bearing type, excellent condition, used on two short jobs only. Price.....**$1450.00**

1—**CRUSHING PLANT**, consisting of: Primary Crusher, Austin Western 21x38 roller bearing with self feeder, powered by D13000 "Caterpillar" Diesel Engine. Secondary Crusher, 10-40 Good Roads, roller bearing crusher, powered by D8800 "Caterpillar" Diesel Engine. Reduction Crusher, Traylor 2'4" Crusher. One 70' centers, belt conveyor, 24" wide, belt driven from 10x40 Crusher. One 70' centers, belt conveyor, 24" wide, powered by geared in head electric motor. One 120' centers, belt conveyor, 24" wide, powered by electric geared in head motor. One 4'x16' two-deck Secco Screen, powered by electric motor. One 3'x8' two-deck New Holland Screen, belt driven from 10x40 Crusher. One 15 or 18 ton truck scale. One Sullivan 210 cu. ft. stationary compressor (less power). One lot of drive belts, chains, sprockets, pulleys, etc. The above is a complete crushing unit and now in operation. Could be moved and reset without additional parts, etc., of any kind. Price **$25,000.00**

1—**BUCKET ELEVATOR**, Columbus Continuous, 14" bucket, 30' centers. Price.....**$615.00**

1—**DOUBLE DRUM HOIST**, Clyde, 25 HP, powered by Model Z Waukesha Engine, RCW 830T. Price **$650.00**

1—**CONCRETE MIXER**, Jaeger Model 7DL, powered by radiator cooled engine, power loader, skip shaker, water regulator, all on 2 pneumatic tired wheels, RCW No. 857. Price.....**$835.00**

1—**PLASTER MIXER**, Jaeger Model 6PVE, powered by radiator cooled gasoline engine, spring mounted, wide axle, 2 pneumatic wheels. Price.....**$325.00**

1—**CONCRETE PAVER**, Koehring Model 27E, complete with water tank, bucket, powered by Waukesha Gasoline Engine, RCW No. 1544. Price **$1995.00**

1—**LOT OF WATER PIPE**, 2 to 4 miles of 3", with couplings. Price per 100 ft.....**$21.00**

1—**SAW RIG**, C. H. & E., Combination Rip and Cut-off, 12" blade, gasoline powered. Price.....**$195.00**

1—**NEW SAW RIG**, Beach No. 1 Contractor's Swing Cut-off, table type, powered by gasoline engine, price new $325.00. Our price.....**$295.00**

10—**NEW SALAMANDERS**, Danto. Price **EACH $12.50**

1—**WHEELBARROW SCALES**, Winslow, Jr., platform type. Price.....**$100.00**

2—**VIBRATING ROCK SCREENS**, Jr. Niagara, 3'x8', single deck, rebuilt at factory. Price **EACH $700.00**

1—**CRAWLER WAGON**, LaPlant-Choate, 10 yd., 2 way, adapted to D7 or D8 Tractor. Price..**$1450.00**

1—**TRENCH HOE ATTACHMENT**, ¾ yd. capacity, for Model 55 Lorain, almost new. Price...**$1200.00**

800 WEST MAIN

ROY-C-WHAYNE SUPPLY COMPANY.

LOUISVILLE, KENTUCKY

SKIP HOIST, 36" dia. drum with 80 H. P. G. E. MTC motor, brake & starter

BUCKETS: 2-yd. Orange Peel
3-yd. Power Wheel Clamshell
3-yd. Hendrix Dragline

IRON & STEEL PRODUCTS, INC.
38 years' experience
13490 S. Brainard Ave., Chicago 33, Ill.
"Anything containing IRON or STEEL"

COMPLETE STONE CRUSHING
or
SAND and GRAVEL PROCESSING SERVICES
available on tonnage basis

We will install NEW, MODERN portable or semi-portable plant in any practical location. Capacity 100 to 150 tons of stone per hour or 150 to 200 tons of sand and gravel per hour.

Estimates Furnished Without Obligation

CONTRACTORS SERVICE CORP. Address **Camp Hill (suburb of Harrisburg), Pa.**

EQUIPMENT AVAILABLE IMMEDIATELY

BALL AND TUBE MILLS

2—UNUSED 7'x23'9" Tube Mills, iron lined, each including 400 H.P., 3/60/2200 v. slip ring motor and starting equipment.
1—5'6x21' Smidth Tube Mill, iron lined.
2—5'x20' Bonnot Tube Mills, silex lined, cast steel heads for direct gear drive.

DIRECT HEAT ROTARY DRYERS

3—4'x30' Ruggles-Coles, now at Rochester, N. Y.
1—5'6x24' Iroquois, made by Lancaster Iron Works. At Newark, N. J.
1—5'x30' Cummer. Now at Newark, N. J.
2—6'x50' Traylor Eng. & Mfg. Co.
4—5'x40' Ruggles-Coles, single shell. Now at Boston.

RAYMOND PULVERIZERS

3—4 roll low side Mills, each with fan, cyclone, inter-connecting piping.
1—5 roll high side type, with "whizzer" separator and everything complete, including motors, steel supports, etc.

HARDINGE CONICAL BALL MILLS

1—4'6x16" iron lined, with A.C. motor and silent chain drive.
1—6'x22" iron lined, with silent chain drive, with or without motor.

ROTARY KILNS

2—8'x125' Vulcan Iron Works.
1—7' & 8'x80' Traylor.
4—5'6 x 7' x 80' Vulcan and Reeves.
1—5'x50' Vulcan.

CRUSHING ROLLS

1—20"x14" Sturtevant, full balanced type.
1—Set 36"x16" Sturtevant.
2—40"x16" Colorado Iron Works.
1—42"x16" Allis-Chalmers.

WASTE HEAT BOILER PLANT

4—750 H.P. Edgemoor Waste Heat Boilers, all ASME, last insured for 200 lbs. working pressure. Including super-heaters, economizers, fuel fans, boiler feed pumps, steel stacks, feed water heater, etc. All in one installation and in good operating condition

FOR 25 YEARS A SYMBOL OF CONFIDENCE

CONSOLIDATED PRODUCTS COMPANY, INC.
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Shops and Yard at Newark, N. J., cover eight acres.

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MOTORS, GENERATORS AND ELECTRICAL EQUIPMENT

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17 East 45th Street New York
Phone MUrray Hill 2-6511—2 & 3

FOR SALE

WATER TOWER

60 ft. on legs and 98 ft. with tank. Built by Chicago Bridge Co. First class condition. Very attractive price.

PUMP

Jaeger Model 353 triplex pump—Serial No. P-1963 Hercules 4 cylinder gasoline engine powered.

Mounted on 4 wheel steel frame trailer, tractor hitch.

TRIPLEX PUMP

Domestic size 3" Giant triplex pump—Powered by Continental 4 cylinder gas engine No. 512-463. Serial number of pump P 39A-2-223. Mounted on 4 wheel steel frame trailer, tractor hitch. Domestic Engine & Pump Co., Shippinsburg, Pa.

Air COMPRESSOR UNIT

Gardner Denver size 9" x 6" vertical duplex portable air compressor unit Class 4J 265 cubic ft. Powered by Buda 4 cylinder size 5¾ x 7⅛ model J V 4 gasoline engine No. 158974 steel enclosure with air receiver vertical paving.

INDUSTRIAL STEEL & SUPPLY CO.
1468 West Ninth Street Cleveland, Ohio

LOCOMOTIVES SHOVELS — CRANES CARS

1—40 ton American 4 wheel saddle tank, standard gauge, A.S.M.E. boiler, completely rebuilt.

1—26 ton American 4 wheel saddle tank, standard gauge, A.S.M.E. boiler, completely rebuilt.

1—18 ton Porter 4 wheel saddle tank, 36" gauge, A.S.M.E. boiler, completely rebuilt.

1—70 ton American type 2-6-2 side tank locomotive, standard gauge, operating condition at present, but can rebuild if desired.

1—40 ft. steel underframe flat car, 50 ton.
1—60 ft. steel underframe flat car, 40 ton.
8—70 ft. steel underframe flat cars, 50 ton.

1—2 yard Hayward rehandling 2 line clamshell bucket, completely overhauled.

Birmingham Rail & Locomotive Co.
BIRMINGHAM, ALABAMA

ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C. for sale at attractive prices. New and Rebuilt. All fully Guaranteed. Send us your inquiries.

V. M. NUSSBAUM & CO., Fort Wayne, Ind.

FOR SALE—A GOOD TIME TO BUY
Cars—36" ga. 3 steel hoppers 25 ton
Cars S/G 8-20 yd. and 10-16 yd. Air dump
Dipper 2½ yd. mang.—Clam 1 yd. Hayward
Life Boats 15 steel—Kedge anchors 15-370 lb.
Locos. 2 diesel 1500 HP—150 tons
Draglines 2 model Cl. 14—1 P&H 800 diesel
Steam shovels 3 model 50 B—cat
Crushers 3 AC 10"—2 New 7"—5 HI roll pul.
Rolls 54x24—24x20—Jaw 24x36—56x84
Kilns 7x8x80—7'6" x 75 ft.
A. V. Konsberg, 8 S. Dearborn St., Chicago

RAILS and ACCESSORIES

RELAYING RAILS—Super-quality machine-reconditioned—not ordinary Relayers.
NEW RAILS, Angle and Splice Bars, Bolts, Nuts, Spikes, Frogs, Switches, Tie Plates, and all other Track Accessories.
Most sizes usually available from warehouse stocks. Every effort made to take care of emergency requirements. Phone, Write or Wire
L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE

18" x 36" Stevenson Single Roll Crusher.
9" x 36" Wheeling Jaw Crusher.
9" x 15" Phillips Jaw Crusher.
#4 Champion Jaw Crusher.
#1 Williams Hammermill Crusher.
PITTSBURGH MACHINERY & EQUIPMENT CO.
Aspinwall Pennsylvania

1—Allis Chalmers Model 54, Motor Grader complete with cab, electric lights, starter and scarifier.

BUTLER BROTHERS
(Iron Ore Miners)
137 E. 8th St. St. Paul 1, Minn.

15 ton, 22' x 9' Bonded Motor Truck Scale..$440.00
20 ton, 24' x 9' Bonded Motor Truck Scale..$525.00
26 ton, 34' x 9' Bonded Motor Truck Scale..$824.00
3' x 8', 2 deck Bonded Vibrating Screen....$685.00

All new—large stocks, immediate delivery. Also guaranteed used equipment without priority.

BONDED SCALE CO., 110 Bellview, Columbus, Ohio
Scale, Vibrating Screen and Crusher Mfrs.

FOR SALE

1—18 cu. ft. Stearns Cement Mixer for cement or cinder block mix.

1—7½ HP Fidelity Motor with three V-Belts attached.

1—Miles conveyor to feed Block Machine 12 ft. long. (Used only 1 yr.—in good shape).

C. J. WENTZ
310 Centennial Avenue Hanover, Pa.

DEPENDABLE USED MACHINES

Cedar Rapids 15 x 36 crusher
Gruendler 10 x 20 crusher
Bay City ¾ yd. shovel, rebuilt
Northwest 104 dragline, 45 ft. boom
Sprout-Waldron 24 x 100 conveyor
Kewanee 18 x 25 self-propelled conveyor
Screens, washers, pumps, buckets, etc.
TRACTOR & EQUIPMENT CO.
3515 W. 51st St. Chicago, Ill.

GOODMAN CATERPILLAR TUNNEL LOADER, caterpillar, electric, with or without generating outfit, works in low ceiling of seven ft., capacity about 40 tons hourly mine rock.

Model L. Scraper with ⅞ yd. Continental Scraper. First class, reconditioned. $3850.00.

M. WENZEL
5322 Aberdeen Road Kansas City 3, Kansas

FOR SALE
1—70,000 & 35,000 Gal. Tank & Tower
1—813 & 500 HP ASME 200 lb. WT Boilers
1—75 Ton 65' Span O. E. T. Crane
1—Steel Bldg. & 7½ Ton O. E. T. Crane
1—120 HP F-M Full Diesel
1—Complete Asphalt Plant
1—Complete Quarry; Compressor; Rotary Screen; Elevator; Crusher, etc.
H. & P. MACHINERY COMPANY
6719 Etzel Ave. St. Louis 14, Mo.

Royal E. Burnham

Attorney at Law

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Patent and Trade-Mark Causes

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511 Eleventh Street, N. W.
WASHINGTON, D. C.

CORE DRILLING ANYWHERE
We look into the earth
PENNSYLVANIA DRILLING COMPANY
PITTSBURGH, PA.

FOR SALE

One National Double Drum Drag Line Hoist, fitted with 100 horse power, 3 phase, 60 cycle electric motor, nearly new. $2,500.00.

UNIVERSAL ROAD MACHINERY COMPANY
Kingston New York

FOR SALE
SLACKLINE CABLEWAY

85' Steel Tower — 150 H.P. Motor — 2 yd. Bucket. Complete in every detail and in best of condition.

KICKAPOO SAND & GRAVEL CO.
Box 112, Peru, Indiana

FOR SALE

24 x 30 NEW HOLLAND ROLL CRUSHER. Usable shape. Bargain for quick sale.

John G. Kemler & Sons
Rochester, Michigan

FOR SALE

Practically as good as new, a two wheel whim which was used for delivering lime rock from a high quarry to kilns. Reason for selling have abandoned quarry; also about 800 feet of 5-8ths cable.

ELLISTON LIME COMPANY
HELENA, MONTANA

FOR SALE

Hetherington and Berner 8 inch pump, practically new.
Suction hose and suction box.
Sand and gravel loader gasoline engine.
Hoist and cables 500 feet heavy steel track.
Red Wing Marine Motor.
MAUMEE RIVER SAND AND GRAVEL CO.
Napoleon, Ohio

FOR SALE

Electric Hydraulic Dredge equipped with 16" Amsco Pump, Bolted Steel Hull, Ladder 65' long, Rotary Cutter, together with 40 Pontoons and lot of accompanying equipment. Assembled to accommodate rail shipment.

AMERICAN AGGREGATES CORPORATION
Greenville, Ohio

CRUSHING EQUIPMENT . . . SPECIALS
THREE NEW COMPEB MILLS 7' x 24' with 400 HP MOTORS.
One NEW 26" Traylor GYRATORY CRUSHER.
18" x 36" FARRELL JAW CRUSHER. MANGANESE JAWS.
ONE 3 foot SYMONS CONE CRUSHER.
ONE 14 INCH NEWHOUSE REDUCTION CRUSHER WITH MOTOR.
Last three items delivered in Canada duty free
H. O. CONKLIN . . . 1660 W. 104th St., CHICAGO

3—Whitcomb Locomotives — Gas — 12 ton—36" Gauge. (One can be changed to Std. Gauge).

20 ton Ohio Loco-Crane—50 ft. boom.

Hayward 2 yd. Orange-Peel Bucket.

27-E Smith Paver with Boom and Bucket.

Tower for Smith Paver.

Bucy-Erie Gas-Air Shovel-Crane, 1¼ yd.

¾ yd. Model 400 P & H Shovel.

1 yd. Link Belt K-30 Shovel.

1 yd. Northwest 105 Shovel-Crane.

10 ton Buf-Springfield Roller, Gas, 3 Wh.

8 ton Buf-Springfield Roller, Gas, 3 Wh.

3 to 4 ton Buf-Springfield Roller, Gas Tandem.

1½ to 2 ton Pierce-Tandem Roller.

24x13 Farrel-Bacon Crusher.

Eimco Tunnel Shovels, 12-B and 20.

5—Electric Hoists, 40, 50 and 60 HP.

McK-Terry Pile Hammers, Nos. 3, 6 and 7.

Adnun Black Top Finisher.

50 HP Locomotive Boiler, Nat. Bd.

15 yd. Steel Bin—2 compartment.

Barnes and LaBour self-priming Pumps, 4".

Thor and Ing-Ran Air Pumps.

Gard-Denver Compressor, 630' A. A. Elec. Dr.

2—Ing-Rand 110' S-Stage Compressors.

22—Busters, Spades, Jackhammers, Tampers, Sheeting Hammers.

¾ yd. Single Line Blaw-Knox Clam.

¾ yd. Owen Type D Clam.

1 yd. Round Shaft Buckets.

1 yd. and ½ yd. Tipover Dump Buckets.

Pullshovel and Skimmer Attachment for ½ yd. P & H.

2—Shovel Attachments for Byers Bearcat Jr. One standard, other for low headroom operation.

Shovel attachment for 41-B Bucy-Erie.

J. T. WALSH

Brisbane Building **Buffalo 3, N. Y.**

FOR SALE

DIESEL DREDGE

Sand and gravel—80' x 26' Wood hull. Two Fairbanks 210 H.P. diesel direct connected to two 12" Morris pumps. Complete in every detail including magnetic type clutches—generators — air compressors — bilge & prime pumps—suction & discharge pipe—19 floats and all necessary equipment. Ready for work and available for inspection.

LOCOMOTIVE CRANE

Browning Steam—8 Wheel—Air brakes. Capacity 43,000 lbs. @ 15' radius 50' boom.

CRUSHER

Allis-Chalmers 6" Superior McCully fine reduction. Serial No. 8374. 5 "V" Belt drive to 71 H.P. (3-60-440) 850 R.P.M. Electric motor. Will sell with or without motor.

LOCOMOTIVE

Vulcan 40 Ton Steam Saddle Tank Type 20" x 36" cylinders. Shop No. 3775.

CONVEYORS

Head pulley with drive—tail pulley—490' used 30" belt—275' new belt—54 troughing rollers—24 idlers. Also one 37' bucket conveyor mounted on 12" channel frame. 18" buckets. With or without electric motor.

E. F. MARSH COMPANY

4030 Chouteau Avenue

ST. LOUIS, MO.

Phone: JEfferson 6155

FOR IMMEDIATE DELIVERY OF RUBBER PRODUCTS

CALL, WIRE or WRITE
CARLYLE
THE RUBBER HEADQUARTERS

Conveyor Belting...Transmission Belting...Elevator Belting...Fire, Water, Air, Steam, Suction or Welding Hose, etc.

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT
FIRE HOSE

APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY
RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached

I.D. Size	Length	Per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.

62-66 PARK PLACE NEW YORK, N. Y.

Jaw Crushers—4"x8" up to 18"x36".
Crushing Rolls—16"x10" up to 54"x24".
Gyratory Crushers—No. 3, No. 12.
Ring Roll Mills—No. 0, No. 1, and No. 2.
Swing Hammer Mills.
Rotary Fine Crushers—Nos. 0, 1, 1½ and 2.
Direct Heat Rotary Dryers—3½'x25', 4'x30', 5'x30', 5½'x40', 6'x50', 7'x50' and 8'x50'.
Semi-indirect heat Dryers—5'x30' & 8½'x75'.
Cement Kilns—3' up to 8' diameter.
Hardinge, Marcy & Fuller-Lehigh Mills.
Raymond Mills—Nos. 00, 0, 1, 2 Roll.
5 new 5'x50' dryers.
Tube—Rod and Ball Mills—3' to 6' diameter.
Vibrating Screens—Air Separators.
1—C. P. T. Cos, portable gasolene eng. driven, 210 cu. ft. compressor.
New Dryers built for all purposes.

W. P. HEINEKEN

277 Fulton St., N. Y. **Tel. Barclay 7-7298**

FOR SALE
COMPLETE SAND AND GRAVEL PLANT

Consisting of

50 ton **steel bin**
25 ton **steel bin**
25 ton **steel bin**
100 ft. x 18" **trough conveyor** complete
44' x 14" **conveyor**
42" x 10' **triple deck screen** complete
8' x 8' steel **charging hopper**
18" steel plate **apron feeder** for belt conveyor
Steel supports for conveyor and screen
Swivel attachment for 14" conveyor
1—15 HP, 1—10 HP and 1—3 HP **electric motors** complete with starters and controls for driving the above with multiple "V" belt pulley drives attached.

Bought about 18 months ago, seen very little service and in like new condition.

International Hoist & Machine Company

556-558 Ferry Street **Newark, N. J.**

FOR SALE

8 & 10 Ton Tandem Steam Rollers
3—10 Yd. Koehring Gas Scrapers
7—10 Yd. Euclid Gas Power R. Tires
1—¾ Yd. Byers 80 Crane Gas
1—⅜ Yd. Hanson Shovel
¾ Yd. Erie Shovel & Crane
9x16 Roller Bearing Jaw Crusher
24" Stedman Impact Crusher
5 Yd. Sauerman Crescent Scraper
12' Blade Caterpillar Pullgrader
2—2 Way Euclid Crawler Rock Wagons
24" Jeffrey Hammer Mill Pulv.
¾ & 1 Yd. Slackline Cableways
60 HP 3 Drum Amer. Gas Hoist
2 & 3 Drum Steam Hoists

Stock constantly changing. TELL US WHAT YOU NEED.

THE T. J. LANE CO.
Box 665 Springfield, Ohio

Jaw Crushers; Buchanan 12x36, Type B, Good Roads 22x50" Plain bearings.
24" x 100' Belt Conveyor, 440 volt MD.
Bucket Loaders, Barber Greene, Haiss, Nelson.
½ yd. P&H Model 300 Crawler Gas Shovel.
¾ yd. P&H Dragline 40' boom, ¾ yd. Bkt.
1 Yard Northwest Dragline 45' Boom 1 yd. Bkt.
4 Compartment Gravel Bin, NEW, 3 deck Simplicity Vib. Screen Gas drive.
3' x 52' Rotary Dryer, oil burner & Fan.
4'9" x 60' x 6' x 60' Dryers ½" plate.
4-8 Ton 24 x 36" Ga Gas Locomotives.
100 HP Fairbanks Morse Diesel Engine.
180 HP Fairbanks Morse VA Full Diesel.
125 HP Venn Severin Diesel, Factory Rebuilt.
What do you need? What have you for sale?

MID-CONTINENT EQUIPMENT COMPANY
Pa 2290 710 Eastgate St. Louis, Mo.

FOR SALE

Successful operating sand business paying nice profit entire output sold for cash each year. Last 12 month demand exceeded supply. Selling price $50,000. Will take due bill for ⅓ of purchase price. Also present customer will enter into a contract with purchaser for a period of not less than 2 years if satisfactory arrangements can be made. Business all clear, will stand fullest investigation. Business is well organized and operating approximately 200 days per year. Plant located Des Moines, Iowa.

Box 708

PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago 5, Ill.

1—55 K. W. Crocker Wheels Generator, 125 Volt D. C. Equipped with 12 Cylinder Lycoming Gasoline Engine.
3—25 K. W. DC 115 V. General Electric Gasoline Driven
1—Centrifugal pump 5" Inlet 4" outlet, 400 gal. per min. against 160' head equipped with G. E. Motor 1850 RPM, 25 H. P., 3 Phase, 60 Cycle 440 Volt.
1—Centrifugal pump 6" Inlet 5" outlet, 650 gal. per min. against 160' head equipped with Western Electric Motor 1750 R.P.M. 40 H. P., 3 phase 60 Cycle, 440 Volt.
1—De Laval Pump 6" Inlet 5" outlet, 800 gallon per min. against 190' head equipped with G. E. Motor 60 H. P., 3 phase, 60 cycle 440 volts.
1—Barber-Green Model 42 Bucket Loader with Buda Gasoline Engine.
1—Hvass Bucket Loader.
1—I/R No. 34 Bit Sharpener.
1—Double Drum National Electric Hoist, 25 H.P. 3 Phase, 60 Cycle, 220 Volt Motor.
1—Jaeger 190 Gallon Steel water measuring Tank.
1—P. & H. Shovel & Crane Combination ¾ Yard Shovel 4 Cylinder Engine 45 Ft. crane Boom.

THE HENRY H. MEYER CO., INC.
110 S. Howard St., P.O. Box 1696, Baltimore, Md.

FOR SALE

P & H Model 206 Crawler, gasoline Crane, 35' boom, now equipped with ¾ yd. Paige dragline bucket. Also shovel attachment for same, boom, ¾ yd. dipper, etc.

GRANT BRICK WORKS
Weldon, N. C.

FOR SALE

BOILER—horiz. 20 hp., fittings and hose
SUCTION HOSE 5" and pipe extensions
HOISTING BLOCKS—wood and steel
TORCH AND FUEL TANK—LOG CHAINS
SULLIVAN BREAKER and DRILL
STEEL MATERIAL BUCKETS ½ cu. yd.

R. J. LUNDGREN
405—51st St. Des Moines, Ia.

FOR SALE

2—Baldwin Locomotives, 33 tons, 4' 8½" gauge, saddle tank, coal fuel, 14" cylinders, 160 boiler pressure, and 44" wheel diameter.
100 tons of ⅝" and ½" Plate.
11 Kilns.
If intersted in any of the above, kindly write to BOX 185, Norristown, Penna., or call Norristown 0940.

1—Fairbanks Morse 90 HP Diesel power unit complete
1—Fairbanks Morse 15 HP single cyl. horizontal oil engine
1—Austin Machinery Co. ⅜ yd. caterpillar crane
1—G. E. 220 volt Motor and starting switch.

JOSEPH A. MERTEL
Peru, Illinois

FOR SALE

One 30"x36" Farrell Bacon Jaw Crusher No. B-15-½; located at Cascade, West Virginia. Offered subject to inspection and acceptance at present location.

C. B. SKINNER COMPANY,
Machinery of Every Description,
627 South Peters St., New Orleans, La.

PROMPT DELIVERY
500 and 1500 ft. 100 lb. Air Compressors.
1¼ Yd. P & H, also Osgood Crawler Cranes.
20-25 Ton American Locomotive Crane.
150 and 240 HP Fairbanks Morse Diesels.
42" x 16" Traylor "AA" Crushing Rolls—New.
35 HP Gasoline Hoist, two drum, Clyde.

MISSISSIPPI VALLEY EQUIPMENT CO.
513 Locust St. St. Louis 1, Mo.
Need Anything? Anything for Sale?

FOR SALE

2—Bonnot cast iron, 27" diam. Filter Presses, 40 and 80 chambers. Crushers, Hammer Mills, Grinders, etc. We buy your surplus equipment.

STEIN EQUIPMENT CO.
426 Broome St. New York City

PRICED FOR QUICK SALE

1—Allis-Chalmers Blake Type Jaw Crusher 10"x20" $800.00

LIPPMANN ENGINEERING WORKS
4603 West Mitchell St. Milwaukee, Wis.

AIR COMPRESSORS—FOR SALE
SULLIVAN, two stage stationary compressor, 1051 cu. ft. displacement. Direct connected to 200 H.P. Fairbanks-Morse oil engine; and receiver tank.
SULLIVAN, straight line, single stage, 12x12 stationary compressor; flat belt drive, with 75 H.P., 3 phase, 60 cycle, 440 volt induction motor, with starter and switch, and receiver tank.

CUNNINGHAM-ORTMAYER COMPANY
429 W. Michigan St. (Zone 3) Milwaukee, Wis.

EXCAVATING EQUIPMENT
BUCYRUS 80 B shovel on cats. LONG BOOM. FINE CONDITION.
BUCYRUS-MONIGHAN. DIESEL ON CATS. 72 Ft. BOOM.
PAGE DIESEL POWER ON CRAWLERS. 60 Ft. BOOM.
No. 8 NORTHWEST 2½ yard. Diesel power. 75 Ft. boom.
No. 2 INDUSTRIAL BROWNHOIST CRANE ON CATS.
SPECIAL. ½ yard Insley gas Cat. SHOVEL.
H. O. CONKLIN . . . 1660 W. 104th St., CHICAGO

---

42 Ton Heisler geared locomotive, ASME.
2½-3 Yd. Diesel Cat. Dragline, 80' boom.
2-W Monighan Diesel dragline, 70' boom.
1¼ Yd. Gas Cat. Dragline, 60' boom.
2½-3 Yd. Electric Shovel, 4 cats., 55' boom.
Shovel Front or parts for P&H ¾ yd.
3 Yd. Electric Drag Scraper outfit, A. C.
Haiss Loader. Fairleads for Link-Belt K-55.
¾ Yd. Clamshell Bucket, $275. Others to 5 yd.
20 HP Industrial type gasoline motor, $125.
Boiler—350 lbs. WP., 24,000' H. S. ASME.
James Wood, 53 West Jackson Blvd., Chicago, Ill.

FOR SALE

1—Acme Jaw Crusher size 6 x 21—New, never been used.
1—McCully Superior Gyratory Crusher size 10"—Used, needs some repairs.

WARREN BROTHERS ROADS COMPANY
38 Memorial Drive Cambridge, Massachusetts

RELAYING RAIL

Practically all weights—Any quantity. Immediate shipment, strictly first quality reconditioned Relaying Rail and Accessories.
Write, Wire or Phone

MIDWEST STEEL CORPORATION
Charleston, W. Va.

FOR SALE

185 HP DIESEL ENGINE. Good condition, and 12" AMSCO SAND PUMP.

BOX 608

Pit and Quarry Publications
538 S. Clark St. Chicago, Ill.

FOR RENT OR SALE

10-B Bucyrus-Erie ⅜ yd. SHOVEL. Serial No. 19883. 1½ yrs. old and used only 5 months.

IRVEN GESELL
RFD No. 5 Brookville, Ind.

WANTED FOR WAR MINE

24 x 36 or 36 x 48 Jaw Crusher.
* * *
4 Ft. or 5 Ft. Cone Crusher.
* * *
1—2500 or 2—1250 Ft. Compressors.
* * *
1—Switch Locomotive.
* * *
1—20 to 30 Ton Locomotive Crane.
* * *
5 Yd. Dragline.
* * *
10—40 to 50 Ton Gondola Cars.
* * *
50,000 Gal. Elevated Water Tank.

BOX 612
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

WANTED TO BUY Air Seal Vault Molds and concrete joist molds, used concrete block machines and pallets.

UNIVERSAL CONCRETE PIPE COMPANY
297 S. High St. Columbus, Ohio

SELL NOW — PRICES HIGH!!!

16, 20, 24 or 30 cubic yard
AIR DUMP CARS
Any quantity, type, make or location.
Also 10 to 100-ton Gas or Diesel Locos.
IRON & STEEL PRODUCTS, INC.
38 years' experience
13490 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

WANTED experienced concrete block and special products man to take full charge of Product Department of national organization having twenty-five plants. Applicant should be familiar with practical side of block and special products manufacture.

BOX 704
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago 5, Illinois

Wanted to buy Standard gauge, all steel, 16, 20 or 30-yard Air Dump cars in good condition. Also, Standard Gauge, all steel, Jordan Spreader ready to work. No junk or equipment which needs extensive repairs.

GIFFORD-HILL & COMPANY, INC.
412 Texas Bank Bldg. Dallas, Texas

LIQUIDATING CEMENT PLANT

at Gilmore City, Iowa

with the Following Items Still Available.

2 No. 5 Type K Allis-Chalmers Gyratory Crushers.
1 No. 5 15 x 24" Mitchell Jaw Crusher.
1 No. 3 Williams Hammer Mill Crusher.
2 44 Ft. Vertical Bucket Elevators with 13 x 5" malleable buckets running in steel case.
1 46 Ft. Vertical Bucket Elevator with 20 x 11" steel buckets running in steel case.
2 3 ft. 4" x 14' Allis Chalmers Rotary Screens.
1 42" Fuller-Lehigh Coal Pulverizer.
1 42" Griffin Mill, manufactured by Bradley Company for pulverizing coal.
1 Bradley Hercules Rock Pulverizing Mill, No. 6631, with 31" x 72" belt pulley.
1 24" troughing type belt conveyor, approximately 85' long, with self propelled tripping attachment.
1 18" troughing type belt conveyor, approximately 30' long.
1 7½ ton Alfred Box & Company, 3 DC motor, double box girder type, 60 Ft. span, traveling bridge crane, with 1½ cu. yd. clam shell bucket.
1 Brown Hoist, 3 AC motors electric man trolley, 6500 Lb. capacity with steel operator's cab and 40 cu. ft. grab bucket.
4 320 HP Bonus 2 drum water tube boilers, each with 140—4" OD tubes 18 ft. long.
1 Allis Chalmers 480V — 1204 A — 107 RPM — 25 cycle—3 phase generator No. 104902, direct connected to 24 x 42" and 48 x 42" horizontal cross compound Corliss Steam Engine No. 88.
1 Exciter for above 14 x 15" horizontal automatic Skinner Engine direct connected to Allis Chalmers DC generator 120 V — 833 A — 25 RPM.
1 No. 4 Stillwell Exhaust Steam Feed Water Heater, manufactured by Platt Iron Works, Dayton, Ohio.
2 9x6x10 Horizontal Duplex Center Outside packed steam boiler feed pumps with iron plungers mfg. by Platt Iron Works.
1 8" x 5" x 12" Burnham Single Center Outside packed steam boiler feed pump with iron plunger manufactured by Union Steam Pump Co.
10 5' x 8'-8" x 22", 3 yd. capacity steel lined automatic end dump 36" gauge quarry cars, manufactured by Wheel Scraper Co.
5 4' x 9'-2" x 32", 3 yd. steel lined 36" gauge end dump quarry cars, manufactured by Kilborn & Jacobs Mfg. Co.
3 6'-2" x 8'-6" x 18", 3 yard capacity, 36" gauge steel lined 2 way side dump quarry cars, mfg. by Pettler Car Corp.
1 6,000 GPH Graver Hot process water softener, complete.
1 100 ton capacity, 42' platform railroad track scales, mfg. by Straight Scale Company.
1 6' x 60' 2 tire rotary rock dryer with trunions, gear drive and belt pulley, mfg. by United Iron Works.
1 9' Dry Pan clay pulverizer with 48" x 10" mullers, mfg. by American Clay Machinery Company.
1 57" x 32' 2 tire rotary clay dryer with trunions and gears arranged for belt drive, mfg. by American Process Company.

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STEAM: 49, 310, 528, 1300 & 2200 Ft.

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12 Ton NORTHWEST 50 Ft. Boom Gas.
12 Ton KOEHRING 45 Ft. Boom Gas.
16 Ton Speedcrane, Gas, 50 Ft. Boom.
25 Ton BROWNING & 30 Ton AMERICAN Locomotive.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
2¼ Yd. Lorain Model 95, Diesel Dragline.
3 Yd. Monighan Diesel Dragline.
5 Yd. Monighan Diesel Dragline.

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½ Yd. P. & H. Gas & ¾ Yd. Insley Gas.
¾ Yd. KOEHRING Gasoline.
¾ Yd., 1¼ Yd., 2 Yd., 4 Yd. & 8 Yd. MARION Electrics.
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1¼ Yd. BUCYRUS 41B Steamer.
1½ Yd. Lima 750 Diesel.
1½ Yd. KOEHRING 601—Gas.

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46—KOPPEL 1½ Yd., 24 & 30 In. Ga., V Shaped.
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20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

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5'x22" HARDINGE CONICAL Dry Ball Mill.
6'x22" HARDINGE CONICAL Pebble Mill.
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8'x22" HARDINGE CONICAL Ball or Pebble Mill.
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2x4½, 5x12 and 6x12 ROD MILLS.
4x16 Smidth Tube Mill Silex.
5½x20 Smidth Tube Mill Mang. Lining.
5½x18 P & M Tube Mill Silex.

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RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
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GRUENDLER XXB Mill & Jay Bee No. 3 & 4.
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7—Ingersoll-Rand Wagon Drills, FB & M2.
29T ARMSTRONG Well Drill.

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17 Steam 7x10, 8½x10 and 10x12.
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No. 36 Am. Ring Roll.
Gruendler No. 6X.

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60 HP Fairbanks Morse.
140 HP Fairbanks Morse.
200 HP Atlas.

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125 K.W. F.M. 250 v. D.C.
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5 Roll High Side.

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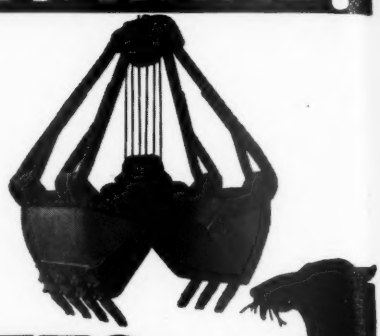

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A MOUTHFUL AT EVERY BITE

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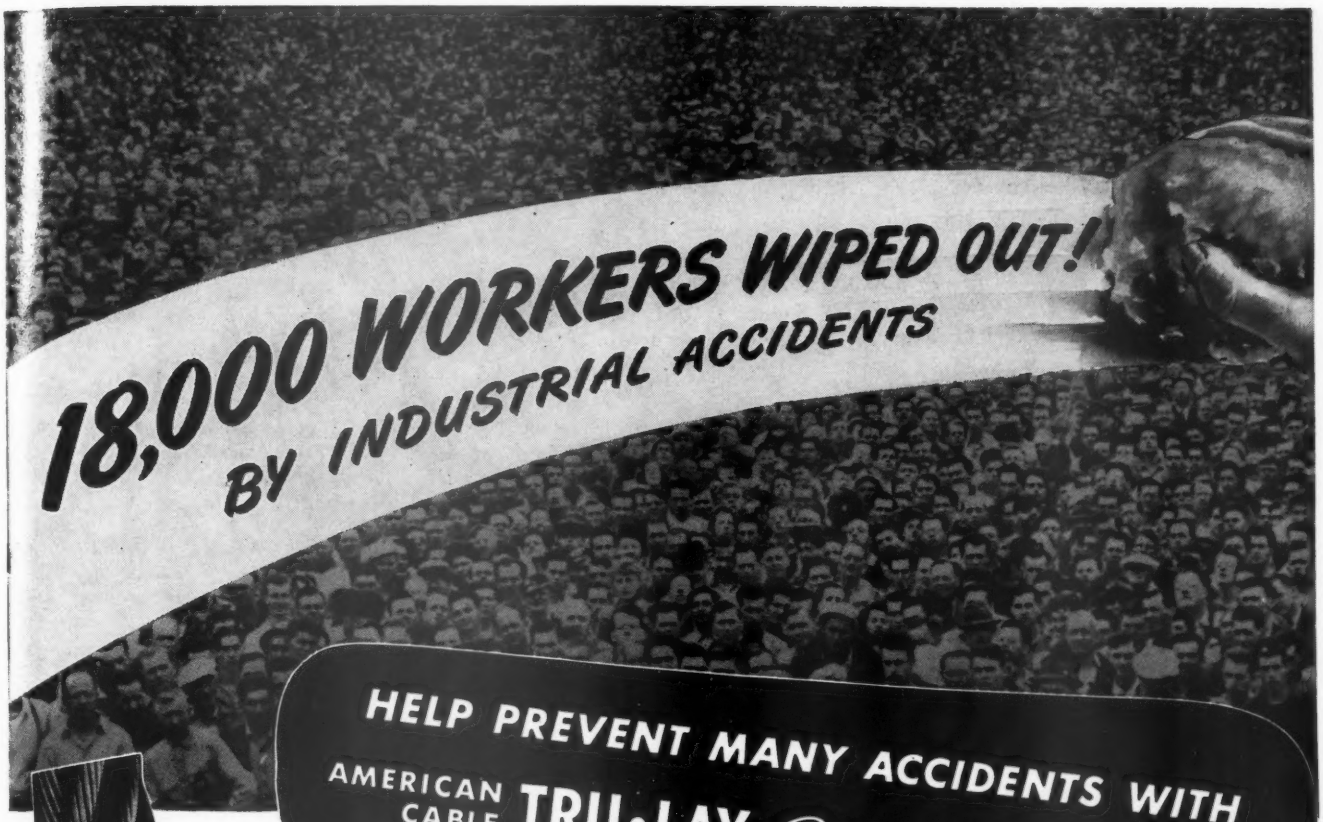

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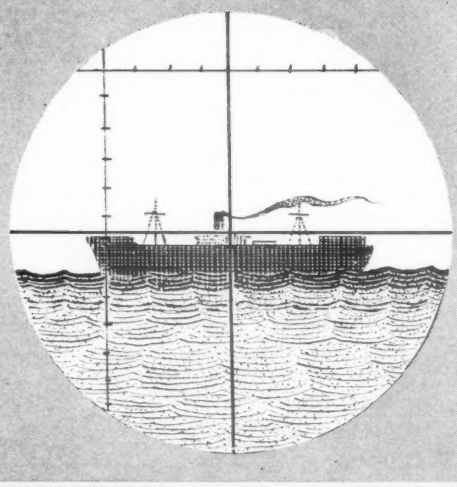

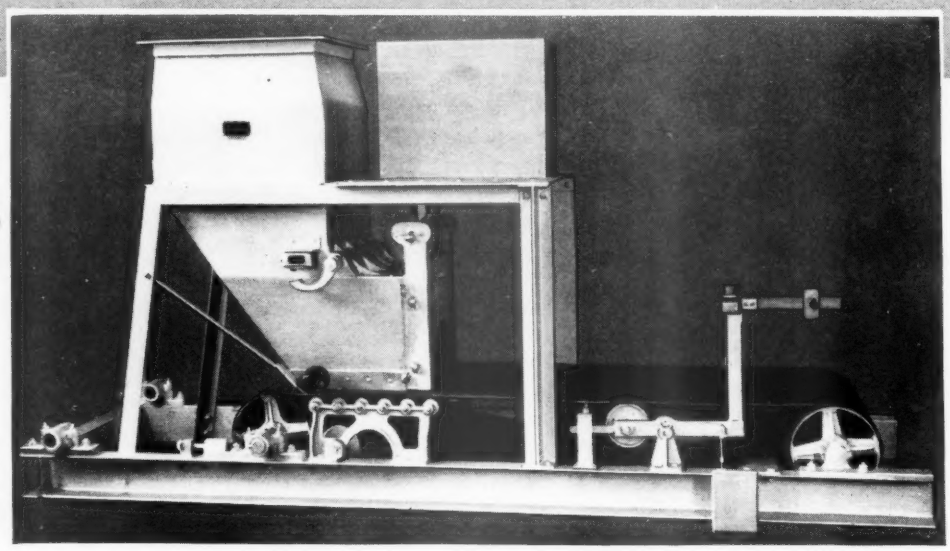

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